United States
Department of
Agriculture

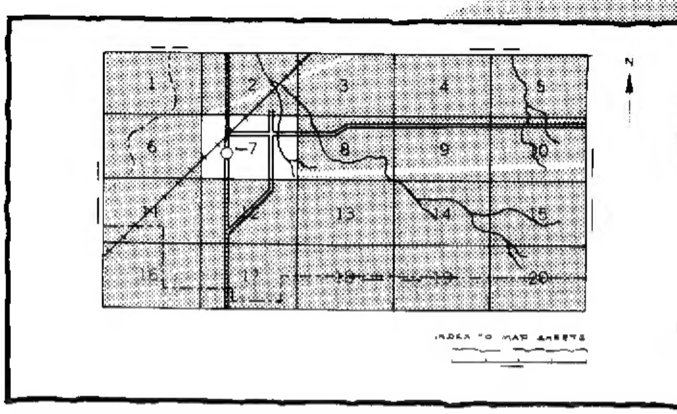
Soil
Conservation
Service

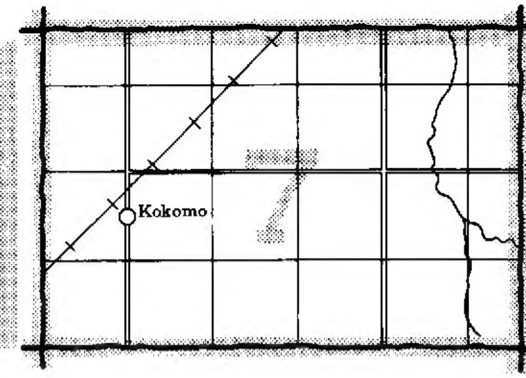
In cooperation with
Purdue University
Agricultural Experiment
Station and
Indiana Department of
Natural Resources,
Soil and Water
Conservation Committee

Soil Survey of Washington County, Indiana

HOW TO USE

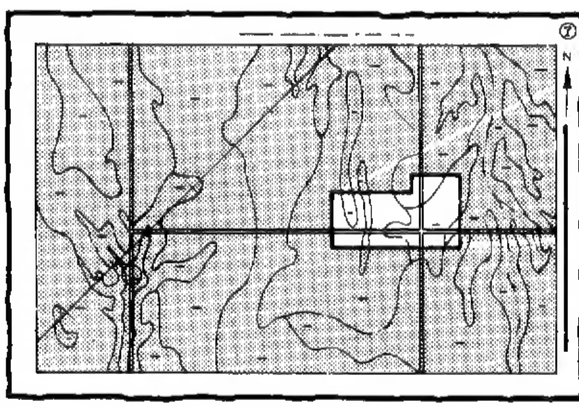
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

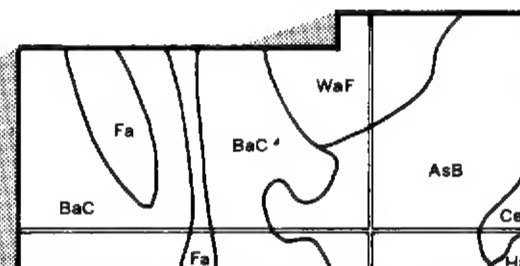




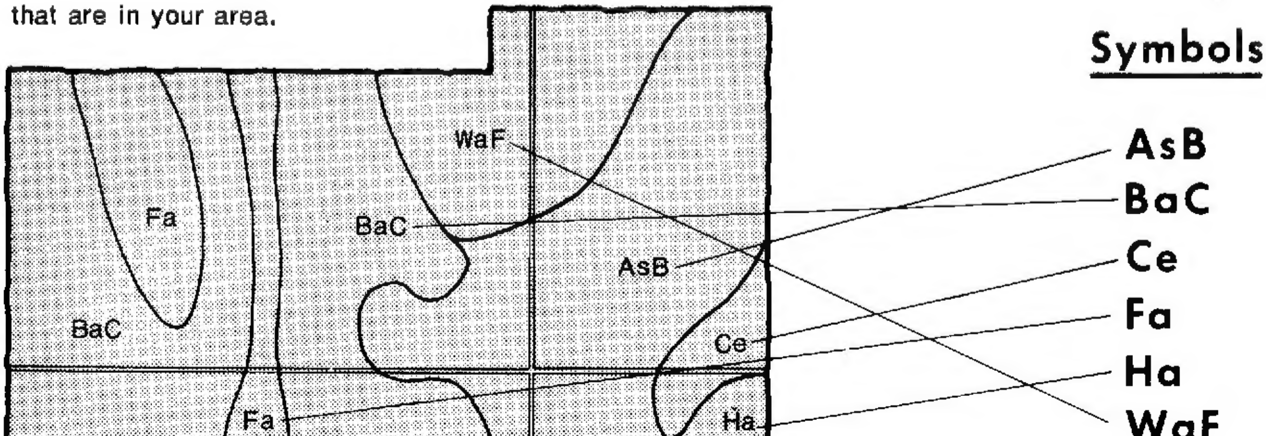
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



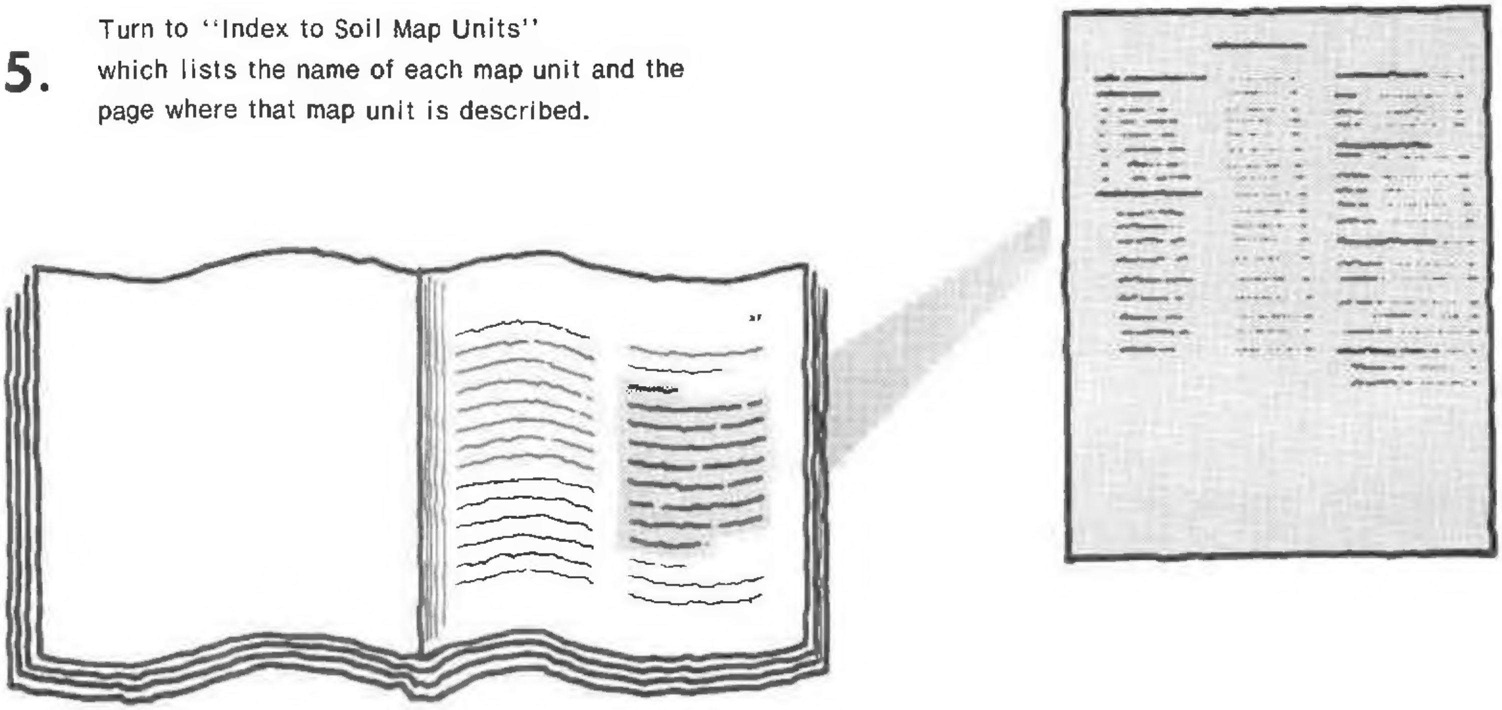


4. List the map unit symbols that are in your area.

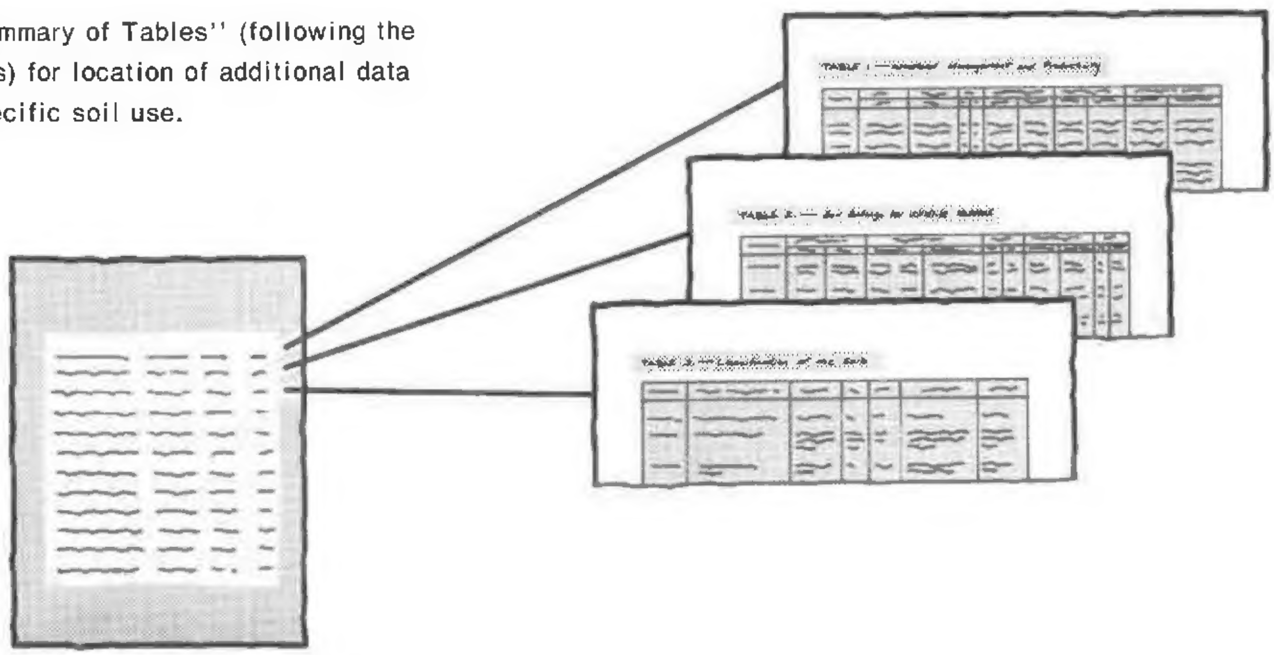


THIS SOIL SURVEY

5. Turn to ''Index to Soil Map Units'' which lists the name of each map unit and the page where that map unit is described.



6. See ''Summary of Tables'' (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, handicap, or age.

Major fieldwork for this soil survey was performed in the period 1978 to 1983. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This survey was made cooperatively by the Soil Conservation Service, the Purdue University Agricultural Experiment Station, and the Indiana Department of Natural Resources, Soil and Water Conservation Committee. It is part of the technical assistance furnished to the Washington County Soil and Water Conservation District. Financial assistance was made available by the Indiana Department of Natural Resources and the county commissioners and was approved by the county council.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Grassed waterway in an area of Crider silt loam, 6 to 12 percent slopes, eroded. Grassed waterways help to control erosion on this soil.

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Soil Series

Issued October 1988

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Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Washington County, Indiana. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Robert L. Eddleman

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State Conservationist
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Location of Washington County in Indiana.

Soil Survey of Washington County, Indiana

By Mac H. Robards, Soil Conservation Service

Fieldwork by Mac H. Robards, Soil Conservation Service, and Mark S. McClain and Steven L. Wade, Indiana Department of Natural Resources, Soil and Water Conservation Committee

United States Department of Agriculture, Soil Conservation Service, in cooperation with Purdue University Agricultural Experiment Station and Indiana Department of Natural Resources, Soil and Water Conservation Committee

WASHINGTON COUNTY is in the south-central part of Indiana. It has a land area of 330,624 acres, or 517 square miles. Salem is the county seat. It is in the central part of the county. In 1980, it had a population of about 5,500.

Farming is the leading enterprise in the county. Cash grain and livestock are the major agricultural products. The major kind of livestock is beef cattle. Other livestock include dairy cows, poultry, and swine. Woodland makes up about a third of the county. It has a high potential for forest products.

This soil survey updates the soil survey of Washington County published in 1939 (*3*). It provides additional information and larger maps, which show the soils in greater detail.

General Nature of the County

This section gives general information concerning the county. It describes climate, relief and drainage, water supply, transportation facilities, manufacturing and business services related to agriculture, and trends in population and land use.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Salem, Indiana, in the period 1951 to 1978. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 33 degrees F, and the average daily minimum temperature is 24 degrees. The lowest temperature on record, which occurred at Salem on February 2, 1951, is -32 degrees. In summer the average temperature is 74 degrees, and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred at Salem on July 14, 1954, is 105 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 43.35 inches. Of this, about 23 inches, or 53 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 5.38 inches at Salem on March 9, 1964. Thunderstorms occur on about 45 days each year.

The average seasonal snowfall is about 19 inches. The greatest snow depth at any one time during the period of record was 20 inches. On the average, 12 days of the year have at least 1 inch of snow on the ground.

The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 75 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 10 miles per hour, in spring.

Relief and Drainage

The soils throughout most of Washington County are on uplands and are moderately sloping to very steep. The soils on terraces and flood plains generally are nearly level or gently sloping.

The highest point in the county is 1,050 feet above sea level. It is in an area of Franklin Township about 0.5 mile south of State Highway 56 and 1 mile northwest of New Philadelphia. The Forest Service has a fire tower at this location. The lowest point in the county is 490 feet above sea level. It is in an area of Brown Township where the East Fork of the White River leaves the county.

Most of the surface water in the county drains to the southwest through three forks of the Blue River. These forks all originate within the county and unite in an area northeast of Fredericksburg. Surface water in the northern third of the county drains to the northwest through the East Fork of the White River, through the Muscatatuck River, and through the tributaries of these two streams. A small area in the western part of the county is drained by the Lost River and the South Fork of the Lost River. Sinkhole areas in the southern and northwestern parts of the county have no surface drainage pattern. Surface water enters the sinkholes and drains through caves into some of the streams.

Water Supply

The water supply is a major problem in most of the county. Underground water is available in some areas. In most areas, however, the water supply is limited and is not adequate even for domestic uses. In many places ponds provide water for livestock, but many of these are not dependable because they dry up during periods of drought. The soils in areas of karst topography are underlain by cavernous limestone and are subject to seepage. As a result, they are not suitable for the construction of new ponds. Many springs are used as a source of water, but the flow from some of these is reduced or stopped during dry periods. Several wells are throughout the county. Lake Salinda and Lake John Hay provide water for Salem and several rural water lines.

Transportation Facilities

Washington County has about 112 miles of federal and state highways and 890 miles of all-weather county roads. Some of the county roads are paved. The county is served by one railroad and by a small airport, which is 1 mile west of Salem.

Manufacturing and Business Services Related to Agriculture

Washington County has two plants that manufacture agricultural limestone; a number of dealerships that sell farm implements, fertilizer, and seed; three plants that process poultry, meat, and dairy products; and one corporation that constructs farm buildings.

Trends in Population and Land Use

The population of Washington County was approximately 21,920 in 1980. It increased 8.8 percent between 1970 and 1980. This trend is expected to continue in the future.

In 1974, about 67 percent of the county was used for crops, pasture, or woodland. During the period 1969 to 1974, the acreage of cropland increased by 17.4 percent, that of pasture decreased by 7.6 percent, that of idle land decreased by 16.5 percent, and that of woodland decreased by 16.1 percent. This trend is expected to continue in the future. The acreage used for urban development is expected to increase.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil

scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such

landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The names, descriptions, and delineations of the soils identified on the general soil map of this county do not always agree or coincide with those of the soils identified on the maps of adjoining counties published at an earlier date. Some differences are the result of changes in concepts of soil series. Other differences result from variations in the extent of the soils. Others are the result of variations in the slope range allowed in the map units.

Soil Descriptions

Areas Dominated by Deep, Gently Sloping to Moderately Steep Soils on Karst Uplands

1. Crider-Frederick

Deep, gently sloping to moderately steep, well drained soils formed in loess and the underlying limestone residuum; on karst uplands

This map unit consists of soils on broad, slightly dissected, loess-covered uplands that are characterized by numerous sinkholes. It makes up about 8 percent of the county. It is about 79 percent Crider soils, 10 percent Frederick soils, and 11 percent minor soils (fig. 1).

Crider soils are gently sloping on ridgetops and moderately sloping to moderately steep on the sides of sinkholes. Typically, the surface layer is dark brown silt loam. It is mixed with strong brown subsoil material. The subsoil is dark brown and strong brown silt loam and silty clay loam in the upper part, reddish brown silty clay in the next part, and dark red and strong brown clay in the lower part.

The moderately sloping to moderately steep Frederick soils are on side slopes adjacent to sinkholes. Typically, the surface layer is dark brown silt loam. It is mixed with a small amount of yellowish red subsoil material. The subsoil is yellowish red silty clay loam and red, brownish yellow, and strong brown clay.

The minor soils in this map unit are the Baxter Variant, Haymond, and Wakeland soils. The well drained Baxter Variant soils are in landscape positions similar to those of the Frederick soils. The well drained Haymond and somewhat poorly drained Wakeland soils are in drainageways and at the bottom of sinkholes.

Most areas are used for cultivated crops, small grain, pasture, or hay. The major soils generally are suited to cultivated crops and small grain and are well suited to pasture. Erosion is the main management concern in cultivated areas. Overgrazing is a major concern in managing pasture because it can result in accelerated erosion and gullying.

Some areas are wooded. The major soils are well suited to woodland. On the steeper slopes, the use of logging equipment is restricted and erosion is a hazard.

The major soils are poorly suited to dwellings and sanitary facilities. The slope is the main limitation.

Areas Dominated by Deep, Nearly Level to Strongly Sloping Soils on Uplands

2. Crider-Bedford

Deep, nearly level to strongly sloping, well drained and moderately well drained soils formed in loess and the underlying limestone residuum; on uplands

This unit consists of soils on broad ridgetops and flats and on long, narrow or moderately broad side slopes adjacent to streams. Most areas are dissected by small drainageways.

This map unit makes up about 44 percent of the county. It is about 59 percent Crider soils, 22 percent Bedford soils, and 19 percent minor soils (fig. 2).

The well drained Crider soils are gently sloping and moderately sloping on ridgetops and moderately sloping and strongly sloping on side slopes adjacent to streams. Typically, the surface layer is dark yellowish brown silt loam. The subsoil is strong brown silty clay loam, reddish brown silty clay, and red clay.

The moderately well drained, nearly level and moderately sloping Bedford soils are on ridgetops. Typically, the surface layer is dark brown silt loam. The subsoil is yellowish brown silt loam and silty clay loam in the upper part; a fragipan of yellowish brown, mottled silty clay loam and silt loam in the next part; and yellowish red, yellowish brown, and light brownish gray silty clay in the lower part.

The minor soils in this map unit are the well drained Hagerstown and Caneyville soils on side slopes and the well drained Haymond and somewhat poorly drained Wakeland soils in narrow drainageways. Hagerstown and Caneyville soils have more clay in the subsoil than the major soils. Also of minor extent are areas where rock crops out on side slopes.

Most areas are used for cultivated crops, for small grain, or for pasture and hay. The major soils are suited to cultivated crops and small grain and are well suited to pasture. The hazard of erosion is the main management concern in cultivated areas. Overgrazing is a major concern in managing pasture because erosion is a problem if plant density is reduced.

Some areas are wooded. The major soils are well suited to woodland. Erosion is a hazard in the steeper areas.

The major soils are fairly well suited to sanitary facilities, dwellings, and recreational uses. The slope of both soils and the wetness and restricted permeability of the Bedford soils are the main management concerns.

3. Wellston-Zanesville

Deep, gently sloping to strongly sloping, well drained and moderately well drained soils formed in loess and the underlying material weathered from sandstone and shale or from sandstone and siltstone; on uplands

This map unit consists of soils on long, narrow or moderately broad ridgetops and on broad, irregularly shaped side slopes. Most areas are dissected by small streams.

This map unit makes up about 2 percent of the county. It is about 40 percent Wellston soils, 37 percent Zanesville soils, and 23 percent minor soils.

The well drained Wellston soils are moderately sloping on ridgetops and moderately sloping and strongly sloping

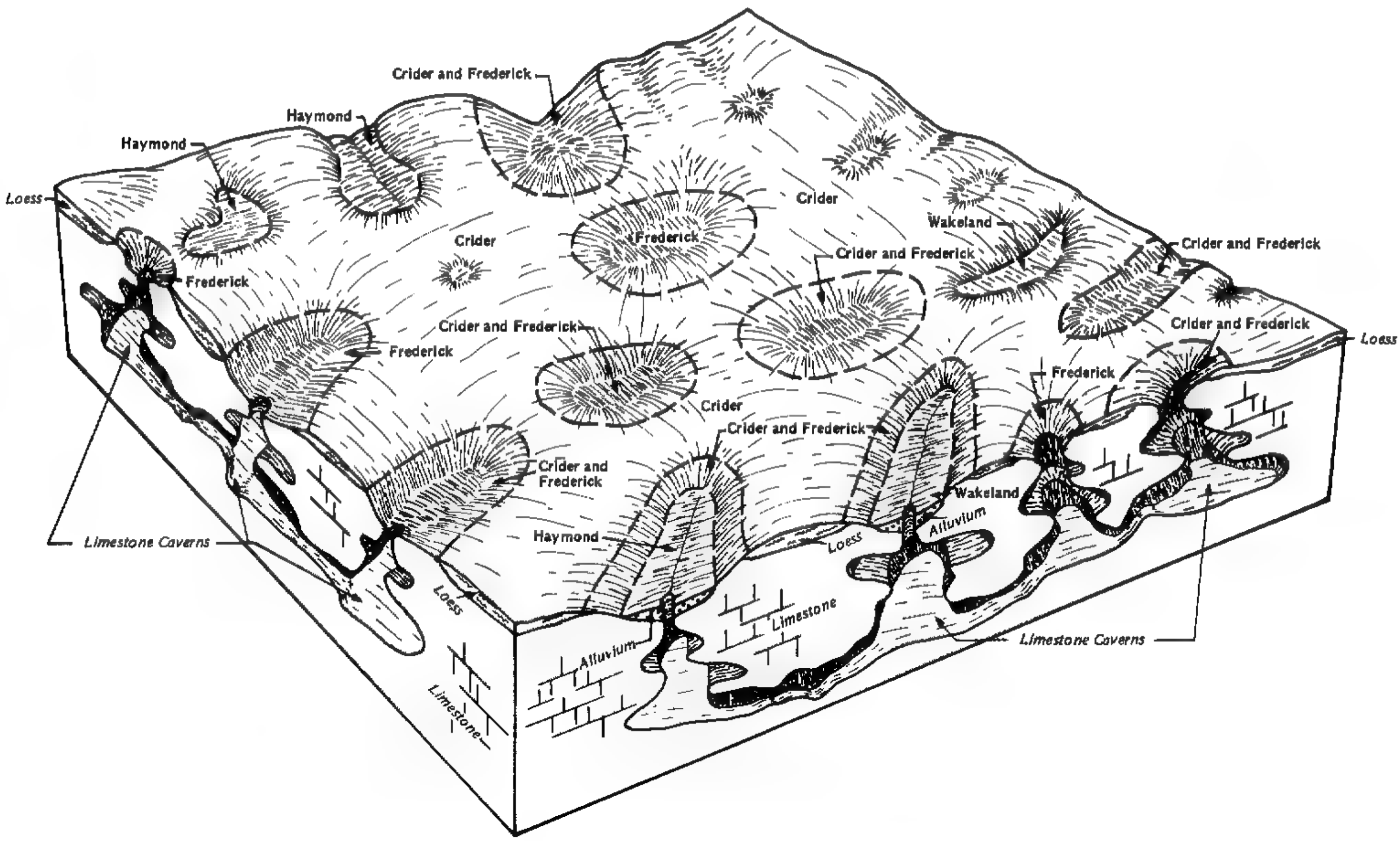

Figure 1.—Pattern of soils and parent material in Crider-Frederick map unit.

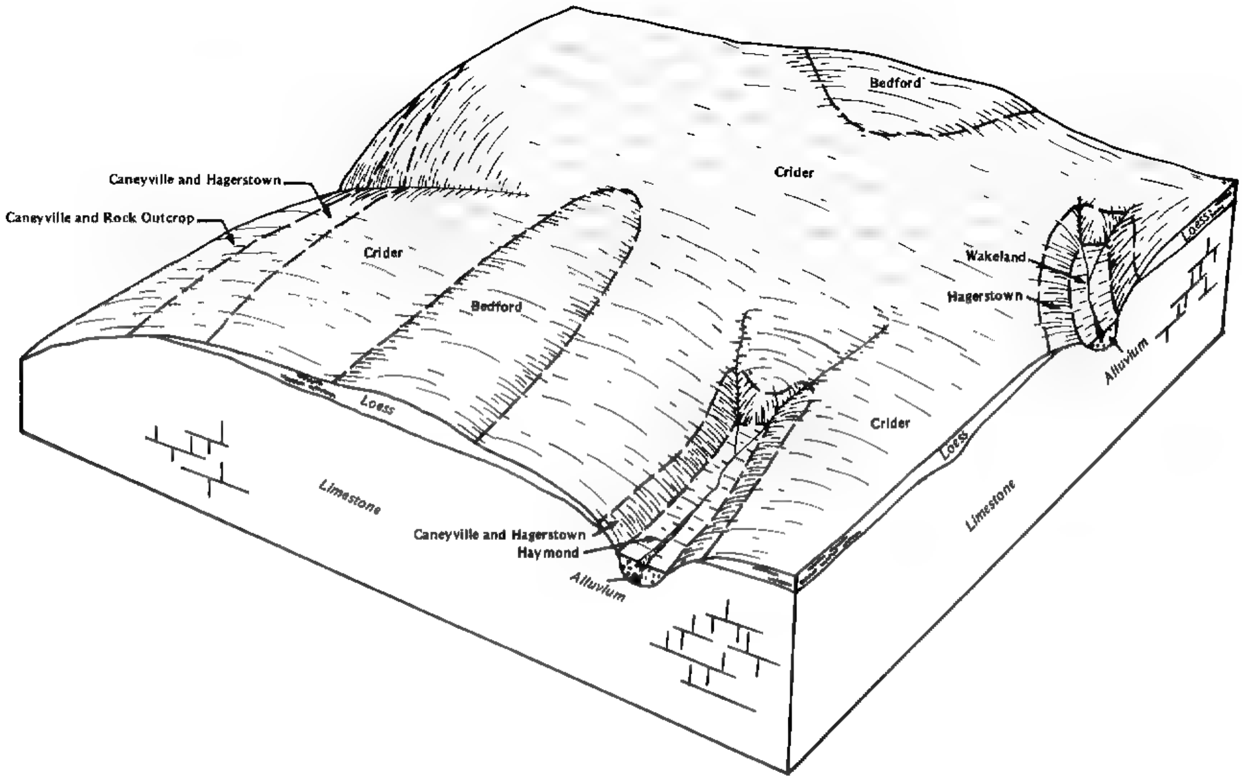

Figure 2.—Pattern of soils and parent material in Crider-Bedford map unit.

on broad side slopes adjacent to streams. Typically, the surface layer is dark brown silt loam. The subsoil is yellowish brown silt loam, silty clay loam, and channery silt loam.

The moderately well drained and well drained, gently sloping and moderately sloping Zanesville soils are on ridgetops. Typically, the surface layer is dark yellowish brown silt loam. In sequence downward, the subsoil is dark yellowish brown silt loam; strong brown, mottled silty clay loam; a fragipan of yellowish brown, mottled silty clay loam and clay loam; and yellowish brown, mottled silty clay loam.

The minor soils in this map unit are the well drained, moderately deep Gilpin and Berks soils on side slopes and the well drained Cuba and somewhat poorly drained Stendal soils, which formed in alluvium in narrow drainageways.

Some of the ridgetops have been cleared of trees and are used for cultivated crops, small grain, or pasture and hay. The major soils are fairly well suited to cultivated crops and small grain and are well suited to pasture. Erosion is the main management concern in cultivated areas. Overgrazing is a major concern in managing pasture because erosion is accelerated if plant density is reduced. In some areas ponds are needed to provide water for livestock.

Uncleared areas support mixed hardwoods and conifers. The major soils are well suited to woodland. Erosion is a hazard in the steeper areas.

The major soils are poorly suited to sanitary facilites, dwellings, and recreational uses. The depth to bedrock and slope of both soils and the wetness of the Zanesville soils are the main management concerns.

Areas Dominated by Shallow to Deep, Well Drained Soils on Uplands

4. Berks-Weikert-Wellston

Shallow to deep, moderately sloping to very steep, well drained soils formed in sandstone, shale, and siltstone residuum or in loess and sandstone and shale residuum; on uplands

This map unit consists of soils on narrow ridgetops and on long, broad, irregularly shaped side slopes. It makes up about 17 percent of the county. It is about 30 percent Berks soils, 22 percent Weikert soils, 21 percent Wellston soils, and 27 percent minor soils.

The moderately deep, steep and very steep Berks soils are commonly on the lower parts of the side slopes or on benches on the side slopes. Typically, the surface layer is dark grayish brown silt loam. The subsurface

layer is brown silt loam. The subsoil is yellowish brown channery silt loam.

The shallow, very steep Weikert soils are commonly on the upper parts of the side slopes. Typically, the surface layer is dark grayish brown channery silt loam. The subsoil is dark brown very channery silt loam.

The deep, moderately sloping and strongly sloping Wellston soils are on the ridgetops. Typically, the surface layer is dark brown silt loam. The subsoil is yellowish brown silt loam, silty clay loam, and channery silt loam.

The minor soils in this map unit are the well drained Gilpin and Zanesville soils on the wider, less sloping ridgetops; the well drained Caneyville soils on side slopes where limestone bedrock crops out; and the well drained Burnside soils along narrow drainageways.

About 20 percent of this map unit has been cleared of trees. Most of the cleared areas are on ridgetops or narrow bottoms. These areas are used as permanent pasture or hayland. The major soils are poorly suited to cultivated crops and pasture because of the slope and the hazard of erosion. Many areas are too narrow for cultivation. The narrow bottom land is subject to flooding.

Uncleared areas support mixed hardwoods and some conifers. The major soils are suited to woodland. The hazard of erosion, the equipment limitation, seedling mortality, and windthrow are management concerns. The use of logging equipment is restricted on the steeper slopes. Erosion is a severe hazard along logging roads and skid trails.

Because of the slope and the depth to bedrock, the major soils are generally unsuited to sanitary facilities and dwellings. They are poorly suited to recreational uses, mainly because of the slope of all three soils and the stoniness of the Weikert soils.

5. Gilpin-Berks

Moderately deep, strongly sloping to very steep, well drained soils formed in sandstone, siltstone, and shale residuum; on uplands

This map unit consists of soils on narrow ridgetops and on long, broad, irregularly shaped side slopes. Most areas are dissected by many small streams.

This map unit makes up about 5 percent of the county. It is about 40 percent Gilpin soils, 25 percent Berks soils, and 35 percent minor soils (fig. 3).

The strongly sloping to very steep Gilpin soils are commonly on the higher parts of the side slopes or on benches on the side slopes. Typically, the surface layer is dark grayish brown loam. The subsurface layer is

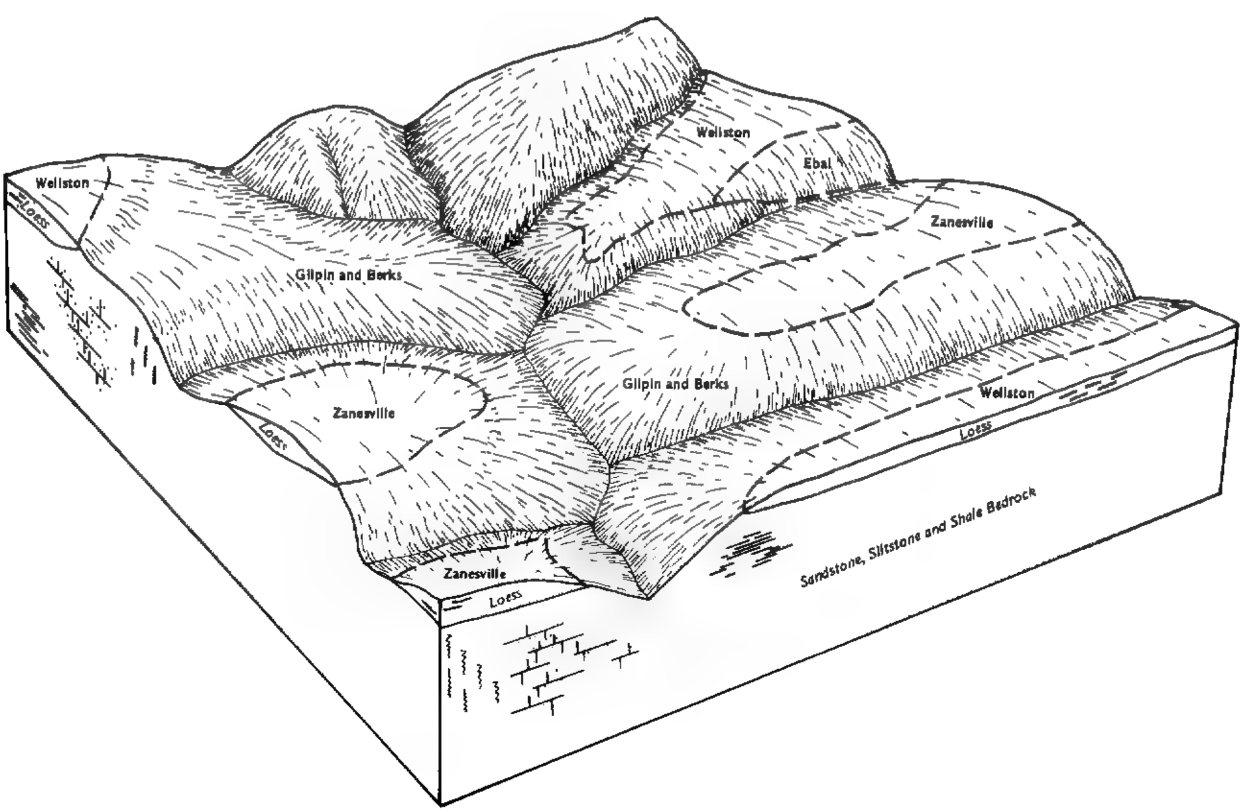

Figure 3.—Pattern of soils and parent material in Gilpin-Berks map unit.

yellowish brown channery loam. The subsoil is light yellowish brown channery loam, yellowish brown loam, and strong brown silty clay loam.

The Berks soils are moderately steep to very steep. Typically, the surface layer is dark grayish brown loam. The subsoil is yellowish brown channery loam.

The minor soils in this map unit are the Ebal, Zanesville, and Wellston soils. The deep, moderately well drained Ebal soils are on side slopes. The deep, well drained Zanesville soils are on less sloping ridgetops. They have a fragipan. The well drained Wellston soils are on long slopes that have smooth breaks.

About 25 percent of this map unit has been cleared. Most of the cleared areas on the side slopes are used as permanent pasture. Because of the slope and the hazard of erosion, the major soils are generally unsuited to cultivated crops and are poorly suited to pasture. Overgrazing is the main concern in managing pasture. If plant density and plant hardiness are reduced, erosion is a hazard.

The uncleared acreage consists of rough, steep areas that support mixed hardwoods and some conifers. The major soils are fairly well suited to woodland. The hazard of erosion, the equipment limitation, and seedling mortality are the main management concerns.

Because of the depth to bedrock and the slope, the major soils are generally unsuited to sanitary facilities and dwellings. They are poorly suited to recreational uses because of the slope.

Areas Dominated by Deep, Well Drained to Somewhat Poorly Drained Soils on Uplands and Lake Plains

6. Cincinnati-Dubois-Haubstadt

Deep, nearly level to moderately sloping, well drained to somewhat poorly drained soils formed in loess and the underlying glacial till or in loess and the underlying lacustrine deposits; on uplands and lake plains

This map unit consists of soils on broad to narrow, irregularly shaped ridgetops and flats and on long and narrow or moderately broad side slopes. It makes up about 2 percent of the county. It is about 52 percent Cincinnati soils, 12 percent Dubois soils, 10 percent Haubstadt soils, and 26 percent minor soils.

The well drained, gently sloping and moderately sloping Cincinnati soils are on side slopes bordering bottom land. Typically, the surface layer is dark brown silt loam. The subsoil is yellowish brown. It is silt loam in the upper part, a fragipan of mottled silt loam in the next part, and mottled loam and clay loam in the lower part.

The somewhat poorly drained, nearly level Dubois soils are on broad ridgetops. Typically, the surface layer is dark brown silt loam. The subsoil is brown and yellowish brown, mottled silt loam in the upper part; a fragipan of light brownish gray, mottled silty clay loam in the next part; and yellowish brown, mottled silt loam in the lower part.

The moderately well drained, gently sloping Haubstadt soils are on ridgetops. Typically, the surface layer is dark brown silt loam. In sequence downward, the subsoil is yellowish brown silt loam; yellowish brown, mottled silty clay loam: a fragipan of yellowish brown, mottled silty clay loam; and strong brown and yellowish brown silty clay loam.

The minor soils in this map unit are the well drained Chetwynd and Otwell soils on side slopes, the moderately well drained Rossmoyne soils on the slightly higher rises, and the somewhat poorly drained Avonburg soils on broad flats and the slightly higher rises.

Most areas have been cleared of trees and are used for cultivated crops, small grain, or hay and pasture. The major soils are fairly well suited to cultivated crops and small grain and are well suited to pasture. Erosion on the Cincinnati and Haubstadt soils and the wetness of the Dubois soils are the main management concerns in cultivated areas. Overgrazing and grazing when the soils are wet are the major concerns in managing pasture. Accelerated erosion can occur if plant density is reduced. Grazing under wet conditions causes surface compaction and poor tilth.

Uncleared areas support mixed hardwoods. The major soils are well suited to woodland. The species that can withstand some wetness should be selected for planting on the Dubois soils.

The major soils are poorly suited to sanitary facilities, dwellings, and recreational uses because of wetness and restricted permeability.

7. Bedford-Bromer

Deep, nearly level to moderately sloping, moderately well drained and somewhat poorly drained soils formed in loess and limestone residuum or in loess, silty sediments, and limestone residuum; on uplands

This map unit consists of soils on narrow or moderately broad, irregularly shaped ridgetops; on long, narrow, irregularly shaped side slopes adjacent to streams; and in broad depressional areas.

This map unit makes up about 8 percent of the county. It is about 49 percent Bedford soils, 26 percent Bromer soils, and 25 percent minor soils.

The moderately well drained, nearly level to moderately sloping Bedford soils are on flats and ridgetops. Typically, the surface layer is dark brown silt loam. The subsoil is yellowish brown silt loam and silty clay loam in the upper part; a fragipan of yellowish brown, mottled silty clay loam and silt loam in the next part; and yellowish red, yellowish brown, and light brownish gray silty clay in the lower part.

The somewhat poorly drained, nearly level Bromer soils are in broad depressional areas. Typically, the surface layer is dark grayish brown silt loam. In

sequence downward, the subsoil is brown and light gray, mottled silt loam; gray, mottled silty clay loam; yellowish brown, mottled silty clay loam; and gray, mottled silty clay.

The minor soils in this map unit are the well drained Crider soils on slight rises, the very poorly drained Montgomery and poorly drained Peoga soils in depressions, and the well drained Haymond and somewhat poorly drained Wakeland soils on bottom land.

Most areas have been cleared of trees and are used for cultivated crops, small grain, or hay and pasture. The major soils are well suited to cultivated crops, small grain, and forage crops. Wetness is a limitation in cultivated areas. Also, erosion is a hazard in the steeper areas. Overgrazing and grazing when the soils are wet are the major concerns in managing pasture. If plant density is reduced, accelerated erosion can occur. Grazing under wet conditions causes surface compaction and poor tilth.

Uncleared areas support mixed hardwoods. The major soils are well suited to woodland. Trees on the Bromer soils should be harvested only during dry periods or when the ground is frozen.

The major soils are poorly suited to sanitary facilities, dwellings, and recreational uses. Wetness and restricted permeability are the main limitations. The slope also is a limitation in some areas.

Areas Dominated by Deep, Somewhat Poorly Drained and Well Drained Soils on Bottom Land

8. Stendal-Haymond

Deep, nearly level, somewhat poorly drained and well drained soils formed in alluvium; on bottom land

This map unit consists of soils in broad to narrow, irregularly shaped areas along streams. Some areas are slightly depressional.

This map unit makes up about 9 percent of the county. It is about 41 percent Stendal soils, 31 percent Haymond soils, and 28 percent minor soils.

The somewhat poorly drained Stendal soils generally are in the lower areas away from the streams. Typically, the surface layer is dark brown silt loam. The underlying material is grayish brown and gray, mottled silt loam.

The well drained Haymond soils generally are adjacent to the streams. Typically, the surface layer is dark brown silt loam. The subsoil is dark yellowish brown and yellowish brown silt loam.

The minor soils in this map unit are the Cuba, Nolin, Wakeland, and Bonnie soils. The well drained Cuba and Nolin soils are adjacent to streams. They contain more clay than the major soils. The somewhat poorly drained Wakeland and poorly drained Bonnie soils are in the more depressional areas away from the streams.

Most areas have been cleared and are used for cultivated crops, small grain, or hay and pasture. The major soils are well suited to cultivated crops, small grain, and forage crops. Wetness and flooding are the main management concerns in cultivated areas. Overgrazing and grazing when the soils are wet are the major concerns in managing pasture. Grazing under wet conditions causes surface compaction and poor tilth.

The major soils are well suited to woodland, but very few areas are wooded.

The major soils are generally unsuited to sanitary facilities and dwellings and are poorly suited to recreational uses. The flooding is the main management concern. Also, the wetness of the Stendal soils is a limitation.

Areas Dominated by Deep, Well Drained to Somewhat Poorly Drained Soils on Bottom Land and Terraces

9. Cuba-Pekin-Bartle

Deep, nearly level to moderately sloping, well drained to somewhat poorly drained soils formed in acid alluvium or in acid, silty sediments; on bottom land and terraces

This map unit consists of soils in broad to narrow, irregularly shaped areas along streams and on the higher rises away from the streams. It makes up about 4 percent of the county. It is about 29 percent Cuba soils, 29 percent Pekin soils, 23 percent Bartle soils, and 19 percent minor soils.

The well drained, nearly level Cuba soils generally are adjacent to streams. Typically, the surface layer is dark brown silt loam. The subsoil is dark yellowish brown and yellowish brown silt loam.

The moderately well drained, nearly level to moderately sloping Pekin soils generally are on terraces and the higher rises away from the streams. Typically, the surface layer is dark brown silt loam. The subsoil is light yellowish brown silt loam in the upper part; yellowish brown, mottled silty clay loam in the next part; and a fragipan of yellowish brown, mottled silty clay loam and silt loam in the lower part.

The somewhat poorly drained, nearly level Bartle soils generally are on broad terraces and the higher rises away from the streams. Typically, the surface layer is grayish brown silt loam. The subsoil is pale brown, mottled silt loam in the upper part; yellowish brown, mottled silty clay loam in the next part; and a fragipan of gray, mottled silt loam in the lower part.

The minor soils in this map unit are the well drained Elkinsville soils on terraces, the poorly drained Peoga soils in shallow depressions on terraces, and the somewhat poorly drained Stendal soils on the lower bottom land away from the streams.

Most areas have been cleared of trees and are used for cultivated crops, small grain, or hay and pasture. The major soils are well suited to cultivated crops, tobacco, small grain, and forage crops. Flooding on the Cuba

soils, the wetness of the Bartle soils, and erosion on the Pekin soils are the main management concerns in cultivated areas. Overgrazing and grazing when the soils are wet are the major concerns in managing pasture. Grazing under wet conditions causes surface compaction and poor tilth.

The major soils are well suited to woodland. The dominant management concern is plant competition.

The major soils are generally unsuited to sanitary facilities, dwellings, and recreational uses. Restricted permeability in all three soils, the wetness of the Pekin and Bartle soils, and flooding on the Cuba soils are the main management concerns.

Areas Dominated by Deep, Very Poorly Drained and Somewhat Poorly Drained Soils on Lacustrine Terraces

10. Zipp-McGary

Deep, nearly level, very poorly drained and somewhat poorly drained soils formed in lacustrine sediments; on terraces

This map unit consists of soils in broad to narrow, irregularly shaped areas on terraces and the slightly higher rises away from the Muscatatuck River. It makes up about 1 percent of the county. It is about 71 percent Zipp soils, 21 percent McGary soils, and 8 percent minor soils.

The very poorly drained Zipp soils generally are on broad flats away from the river. Typically, the surface layer is dark grayish brown silty clay. The subsoil is gray, mottled silty clay.

The somewhat poorly drained McGary soils generally are on the narrow flats in the slightly higher areas near the river. Typically, the surface layer is brown silt loam. The subsoil is light brownish gray, mottled silty clay loam and yellowish brown, mottled silty clay.

The minor soils in this map unit are the poorly drained Bonnie and somewhat poorly drained Stendal soils on bottom land and the well drained Markland soils on the higher terraces near drainageways.

Most areas are used for cultivated crops, small grain, or hay and pasture. The major soils are suited to cultivated crops, tobacco, and small grain and are well suited to pasture. Wetness is the main management concern in cultivated areas. The Zipp soils are subject to ponding in winter and spring. Overgrazing and grazing when the soils are wet are the major concerns in managing pasture. Grazing under wet conditions causes surface compaction and poor tilth.

A few areas support mixed hardwoods. The major soils are suited to woodland. The dominant management concerns are the equipment limitation, seedling mortality, and the windthrow hazard, all of which are caused by wetness.

The major soils are generally unsuited to sanitary facilities, dwellings, and recreational uses because of ponding, wetness, and restricted permeability.

Broad Land Use Considerations

The soils in Washington County vary widely in their suitability for major land uses. Approximately 17 percent of the county is used for row crops, mainly corn and soybeans. This cropland is mainly in map units 1, 2, 3, 6, 7, 8, 9, and 10. The major soils in map unit 8 and the Cuba soils in map unit 9 are frequently or occasionally flooded, mainly in winter and early spring. The flooding may slightly delay planting and thus reduce yields. Wetness is the major concern in managing some of the major soils in map units 6 through 10 for crops. These are the Dubois soils in map unit 6, the Bromer soils in map unit 7, the Stendal soils in map unit 8, the Bartle soils in map unit 9, and both of the major soils in map unit 10. Erosion is the main management concern in cultivated areas of map units 1, 2, and 3 and in areas of Cincinnati, Haubstadt, and Rossmoyne soils in map unit 6.

Approximately 35 percent of the county is used for hay and pasture. Nearly all of the map units are well suited to pasture and hay, but map units 4 and 5 are poorly suited.

About 39 percent of the county is woodland. The productivity of the soils for hardwoods is dominantly high in map units 1 and 2 and moderately high in map units 3 through 10. The use of equipment is restricted by wetness in some areas. It is restricted by the slope in map units 4 and 5.

About 7,460 acres in the county, or about 2 percent of the total acreage, is urban or built-up land. In general, the gently sloping Crider soils in map units 1 and 2 have the best suitability for urban uses. In other map units the depth to bedrock, restricted permeability, ponding, wetness, and the slope are limitations. Soils on flood plains, such as the Stendal and Haymond in map unit 8 and the Cuba soils in map unit 9, are generally unsuitable for urban development because of flooding. The steep and very steep soils in map units 4 and 5 are generally unsuited to urban uses because of the slope. Also, the depth to bedrock is a limitation in some areas. Even on the less sloping parts of these units, careful onsite investigation is needed before a dwelling is constructed.

The suitability of most of the soils in the county for recreational uses is dominantly fair or poor. The intensity of the expected use and the physical and chemical properties of the soils should be considered. Map units 1, 2, and 3 are suited to intensive recreational uses. All or parts of map units 6 through 10 are severely limited as sites for these uses because of restricted permeability, wetness, ponding, or flooding, and map units 4 and 5 are limited because of the slope. Small

areas that can be developed for intensive uses are available in map units 4, 5, 6, 7, and 9. Map unit 2 is suitable for extensive recreational uses, such as trails for hiking or horseback riding.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Crider silt loam, 6 to 12 percent slopes, eroded, is a phase of the Crider series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Gilpin-Berks-Ebal complex, 18 to 50 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarries, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

The names, descriptions, and delineations of the soils identified on the detailed soil maps of this county do not always agree or coincide with those of the soils identified on the maps of adjoining counties published at an earlier date. Some differences are the result of changes in concepts of soils series. Other differences result from variations in the extent of the soils. Others are the result of variations in the slope range allowed in the map units.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

AlB—Alvin fine sandy loam, 2 to 6 percent slopes. This gently sloping, deep, well drained soil is on terraces. Areas are 3 to 40 acres in size.

In a typical profile, the surface layer is dark brown fine sandy loam about 10 inches thick. The subsoil is about 40 inches thick. The upper part is strong brown, friable fine sandy loam; the next part is dark brown, firm sandy clay loam; and the lower part is dark brown, friable sandy loam. The underlying material to a depth of 60 inches is yellowish brown loamy sand. In some places the surface layer is loam. In other places the upper part of the subsoil has thin bands of sandy loam or sandy clay loam. In some areas the slope is more than 6 percent.

Included with this soil in mapping are small areas of the well drained Cuba soils in the lower drainageways. These soils are more silty than the Alvin soil. They make up about 10 percent of the map unit.

The Alvin soil is moderately permeable in the upper part and moderately rapidly permeable in the underlying material. Available water capacity is moderate. Runoff is medium. The organic matter content is low in the surface layer. This layer is friable and can be easily tilled.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as melons and tobacco.

This soil is well suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are crop rotations that include grasses and legumes, a system of conservation tillage that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures. The soil is well suited to no-till planting. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is well suited to grasses and legumes, such as orchardgrass and red clover, for hay or pasture. Erosion is a hazard. Overgrazing causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, and timely grazing minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

This soil is suitable as a site for dwellings and septic tank absorption fields. The sides of shallow excavations can cave in unless they are reinforced. The soil is moderately limited as a site for local roads and streets because of frost action. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 4A.

AvA—Avonburg silt loam, 0 to 2 percent slopes. This nearly level, deep, somewhat poorly drained soil is on uplands. Areas range from 3 to 60 acres in size.

In a typical profile, the surface layer is brown silt loam about 7 inches thick. The subsurface layer is brown, mottled silt loam about 4 inches thick. The subsoil extends to a depth of about 80 inches. The upper part is yellowish brown and light brownish gray, mottled, friable and firm silt loam; the next part is a fragipan of light brownish gray, mottled, firm and brittle silty clay loam and silt loam; and the lower part is light brownish gray and gray, mottled, firm silt loam. In some areas the fragipan is within a depth of 15 inches. In other areas the silty material extends to a greater depth. In some places the solum is less than 60 inches thick. In other places the slope is more than 2 percent.

Included with this soil in mapping are small areas of the well drained Cincinnati and Hickory soils on the steeper side slopes and the moderately well drained Rossmoyne soils on the slightly higher rises. Also included are small areas of very poorly drained soils in depressions. Included soils make up about 10 percent of the map unit.

The Avonburg soil is very slowly permeable. A perched water table is at a depth of 1 to 3 feet during the winter and early spring. Available water capacity is moderate. Runoff is slow. The organic matter content is low in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

If drained, this soil is well suited to corn, soybeans, and small grain. Wetness is the main limitation. If suitable outlets are available, a subsurface drainage system can lower the water table. A conservation tillage system that leaves protective amounts of crop residue on the surface, crop residue management, cover crops, and green manure crops help to maintain or improve tilth and increase the organic matter content.

If drained, this soil is well suited to grasses and some legumes for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of wetness and frost action. A drainage system is necessary. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth. Overgrazing also reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods help to prevent excessive compaction and maintain good tilth and plant density.

This soil is fairly well suited to trees. The main management concerns are seedling mortality, the windthrow hazard, and plant competition. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying. Special planting stock and overstocking are needed. Some replanting is generally necessary. Carefully thinning the stands or not thinning them at all helps to prevent windthrow.

This soil is severely limited as a site for dwellings because of the wetness and as a site for septic tank absorption fields because of the wetness and the very slow permeability. Subsurface drains help to lower the water table. Perimeter drains are needed on sites for septic tank absorption fields. Providing suitable fill material improves the ability of the field to absorb the effluent.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Replacing or covering the upper soil layers with suitable base material helps to prevent the damage caused by frost action.

The land capability classification is IIw. The woodland ordination symbol is 4D.

Ba—Bartle silt loam. This nearly level, deep, somewhat poorly drained soil is on terraces. Areas range from 4 to 300 acres in size.

In a typical profile, the surface layer is grayish brown silt loam about 8 inches thick. The subsoil is about 42 inches thick. The upper part is pale brown, mottled, friable silt loam; the next part is yellowish brown, mottled, friable silty clay loam; and the lower part is gray, mottled, firm and brittle silt loam. The underlying material to a depth of 60 inches is yellowish brown, mottled silt loam. In places the fragipan is at a depth of 18 to 24 inches. In some areas the soil has less clay.

Included with this soil in mapping are small areas of the moderately well drained Pekin soils on the slightly higher terraces along narrow drainageways and the poorly drained Peoga soils in the lower depressions. Also included are the well drained Cuba soils in the lower drainageways. Included soils make up about 15 percent of the map unit.

The Bartle soil is very slowly permeable. The water table is at a depth of 1 to 2 feet during the winter and early spring. Available water capacity is moderate. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

If drained, this soil is well suited to corn, soybeans, and small grain. Wetness is the main limitation. If suitable outlets are available, a subsurface drainage system can lower the water table. A conservation tillage system that leaves protective amounts of crop residue on the surface, crop residue management, cover crops, and green manure crops help to maintain or improve tilth and increase the organic matter content.

If drained, this soil is well suited to grasses and some legumes for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of wetness and frost action. A drainage system is necessary. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Overgrazing also reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods help to prevent excessive compaction and maintain plant density.

This soil is well suited to trees. Plant competition is severe. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

This soil is severely limited as a site for dwellings because of the wetness and for septic tank absorption fields because of the wetness and the very slow permeability. Subsurface drains help to lower the water table. Perimeter drains are needed on sites for septic tank absorption fields. Providing suitable fill material improves the ability of the field to absorb the effluent.

This soil is severely limited as a site for local roads and streets because of frost action. Replacing or covering the upper soil layers with suitable base material reduces the potential for frost action.

The land capability classification is IIw. The woodland ordination symbol is 4A.

BdA—Bedford silt loam, 0 to 2 percent slopes. This nearly level, deep, moderately well drained soil is on uplands. Areas range from 3 to 40 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 10 inches thick. The subsoil extends to a depth of about 80 inches. The upper part is yellowish brown, friable and firm silt loam and silty clay loam; the next part is a fragipan of brown and strong brown, mottled, firm and brittle silty clay loam; and the lower part is variegated red and strong brown, very firm silty clay. In some places base saturation is high. In other places the depth to the fragipan is less than 25 inches. In some areas the lower part of the subsoil has more clay. In other areas the slope is more than 2 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Bromer soils and the poorly drained Peoga soils that have a clayey substratum. Both of these soils are in the lower depressions or nearly level areas. Also included are the well drained Crider soils in the lower areas. Included soils make up 12 to 15 percent of the map unit.

The Bedford soil is moderately permeable above the fragipan and very slowly permeable in the fragipan. The water table is at a depth of 1.5 to 3.5 feet during the winter and early spring. Available water capacity is moderate. Runoff is slow. The organic matter content is moderately low in the surface layer. This layer should be tilled at the proper moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few areas are wooded or are used for specialty crops, such as orchard crops and tobacco.

This soil is well suited to corn, soybeans, and small grain. Wetness is the main limitation. If suitable outlets are available, a subsurface drainage system can lower the water table. In years when rainfall is below average or is poorly distributed, crops can be damaged by drought. A conservation tillage system that leaves protective amounts of crop residue on the surface, crop residue management, cover crops, and green manure crops help to maintain or improve tilth and increase the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the penetration of roots and the downward movement of water. Wetness is a limitation. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Overgrazing also reduces plant density and plant

hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods help to prevent excessive compaction and maintain good tilth and plant density.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because of the wetness and the shrink-swell potential, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of the wetness. Subsurface drains help to lower the water table. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Replacing or covering the upper soil layers with suitable base material helps to prevent the damage caused by frost action.

Because of the wetness and the very slow permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains help to lower the water table. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIw. The woodland ordination symbol is 4A.

BdB—Bedford silt loam, 2 to 6 percent slopes. This gently sloping, deep, moderately well drained soil is on uplands. Areas range from 3 to 150 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 9 inches thick. The subsoil extends to a depth of about 80 inches. The upper part is yellowish brown, friable and firm silt loam and silty clay loam; the next part is a fragipan of yellowish brown, mottled, very firm and brittle silty clay loam and silt loam; and the lower part is yellowish brown, yellowish red, and light brownish gray, very firm silty clay. In some places base saturation is high. In other places the depth to the fragipan is less than 20 inches. In some areas the lower part of the subsoil has more clay. In other areas the soil is underlain by thin strata of sand. In places the slope is less than 2 or more than 6 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Bromer soils and the poorly drained Peoga soils that have a clayey substratum. Both of these soils are in the lower depressions. Also included are the well drained Crider soils in the lower areas and small areas of severely eroded soils. Included soils make up 12 to 15 percent of the map unit.

The Bedford soil is moderately permeable above the fragipan and very slowly permeable in the fragipan. The water table is at a depth of 1.5 to 3.5 feet during the winter and early spring. Available water capacity is moderate. Runoff is medium. The organic matter content is moderately low in the surface layer. This layer is friable.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few areas are wooded or are used for specialty crops, such as orchard crops and tobacco.

This soil is well suited to corn, soybeans, and small grain. Erosion is the main management concern. A system of conservation tillage that leaves protective amounts of crop residue on the surface minimizes erosion and crusting and increases the rate of water infiltration (fig. 4). Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the penetration of roots and the downward movement of water. Erosion is a hazard. Overgrazing or grazing when the soil is wet causes surface compaction, excessive runoff, and poor tilth. Overgazing also reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because of the wetness and the shrink-swell potential, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of the wetness. Subsurface drains help to lower the water table. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Replacing or covering the upper soil layers with suitable base material helps to prevent the damage caused by frost action.

Because of the wetness and the very slow permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains help to lower the water table. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIe. The woodland ordination symbol is 4A.

BdC2—Bedford silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, moderately well

Figure 4.—Residue of corn on the surface of Bedford silt loam, 2 to 6 percent slopes.

drained soil is on uplands. Areas range from 3 to 100 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 5 inches thick. It is mixed with a small amount of yellowish brown subsoil material. The subsoil extends to a depth of about 80 inches. The upper part is yellowish brown, friable and firm silt loam and silty clay loam; the next part is a fragipan of yellowish brown, mottled, firm and brittle silt loam and silty clay loam; and the lower part is yellowish red and brown, very firm silty clay and clay. In some places the depth to the fragipan is less than 25 inches. In other places base saturation is high. In some areas the soil is underlain by thin strata of sand. In other areas the lower part of the subsoil has a higher content of clay. In places the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Bromer soils and the poorly drained Peoga soils that have a clayey substrutum. Both of these soils are in the lower depressions and in nearly level areas. Also included are small areas of the well drained Crider soils on the lower parts of the landscape and small areas of severely eroded soils. Included soils make up 12 to 15 percent of the map unit.

The Bedford soil is moderately permeable above the fragipan and very slowly permeable in the fragipan. The water table is at a depth of 1.5 to 3.5 feet during the

winter and early spring. Available water capacity is moderate. Runoff is rapid. The organic matter content is moderate in the surface layer.

Most areas of this soil are used for hay and pasture. Some are used as woodland. A few are used for cultivated crops or for specialty crops, such as orchard crops and tobacco.

This soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are a cropping system that includes grasses and legumes, a system of conservation tillage that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the penetration of roots and the downward movement of water. Erosion is a hazard. Overgrazing or grazing when the soil is wet causes surface compaction, excessive runoff, and poor tilth. Overgrazing also reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. No major hazards or limitations affect planting and harvesting.

Because of the wetness, the shrink-swell potential, and the slope, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of the wetness. Subsurface drains help to lower the water table. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling. The buildings should be designed so that they conform to the natural slope of the land.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Replacing or covering the upper soil layers with suitable base material helps to prevent the damage caused by frost action.

Because of the wetness and the very slow permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains help to lower the water table. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

BhF—Berks-Weikert complex, 25 to 75 percent slopes. These steep and very steep, well drained soils are on side slopes in the uplands (fig. 5). The Berks soil is moderately deep, and the Weikert soil is shallow. Areas range from 10 to 40 acres in size. They are about 55 percent Berks soil and 35 percent Weikert soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Berks soil, the surface layer is dark grayish brown silt loam about 2 inches thick. The subsurface layer is brown silt loam about 5 inches thick. The subsoil is yellowish brown, friable channery silt loam about 15 inches thick. The underlying material is yellowish brown very channery silt loam about 9 inches thick. Below this is hard, yellowish brown sandstone bedrock. In some areas the soil is underlain by grayish green shale.

In a typical profile of the Weikert soil, the surface layer is dark grayish brown channery silt loam about 3 inches thick. The subsoil is dark brown, friable very channery silt loam about 9 inches thick. Below this is fractured, grayish brown sandstone bedrock. In some areas the soil is underlain by grayish green shale.

Included with these soils in mapping are small areas of the well drained Chetwynd soils on the lower side slopes and the well drained Ebal and Zanesville soils on the higher ridgetops. Chetwynd soils are sandier than the Berks and Weikert soils. Ebal soils are more clayey than the Berks and Weikert soils. Zanesville soils have a fragipan. Also included are small areas of severely eroded soils and small areas where gully erosion has occurred. Included soils make up about 10 percent of the map unit.

The Berks soil is moderately permeable or moderately rapidly permeable, and the Weikert soil is moderately rapidly permeable. Available water capacity is very low in both soils. Runoff is very rapid. The organic matter content is moderately low in the surface layer.

Most areas are wooded (fig. 6). Because of the slope, the hazard of erosion, and the very low available water capacity, these soils are generally unsuited to corn, soybeans, and small grain and to grasses and legumes for hay or pasture. They are suited to trees. The erosion hazard, the equipment limitation, seedling mortality, the windthrow hazard, and plant competition are concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. Special logging methods, such as yarding the logs uphill with a cable, may be needed to minimize the use of rubber-tired and crawler tractors. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying. Special planting stock and overstocking are needed. Some replanting is generally necessary. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

These soils are generally unsuitable as sites for dwellings, local roads and streets, and septic tank

Figure 5.—An area of Berks-Weikert complex, 25 to 75 percent slopes. Stendal soils are on the bottom land in the foreground.

absorption fields because of the slope and the depth to bedrock.

The land capability classification is VIIe. The woodland ordination symbol of the Berks soil is 4R, and that of the Weikert soil is 3R.

BmC—Bloomfield loamy fine sand, 6 to 18 percent slopes. This moderately sloping and strongly sloping, deep, well drained soil is on ridgetops in the uplands. Areas range from 4 to 15 acres in size.

In a typical profile, the surface layer is dark brown loamy fine sand about 9 inches thick. The subsurface layer is loamy fine sand about 29 inches thick. The upper part is brown, and the lower part is yellowish brown. The subsoil extends to a depth of about 65 inches. The upper part is pale brown, loose fine sand that has bands of dark yellowish brown, friable loamy fine sand. The lower part is dark yellowish brown, friable loamy fine sand that has bands of yellowish brown, loose fine sand. The underlying material to a depth of 80 inches is brown fine sand. In places the surface layer is sandy loam. In some areas the subsoil has more clay. In other areas the soil is neutral throughout.

Included with this soil in mapping are small areas of the well drained Berks, Gilpin, Weikert, and Wellston soils on the higher side slopes. These soils are not so sandy as the Bloomfield soil. Also included are small areas of severely eroded soils. Included soils make up 8 to 10 percent of the map unit.

The Bloomfield soil is moderately rapidly permeable and rapidly permeable. Available water capacity is low. Runoff is medium. The organic matter content is moderately low in the surface layer.

Figure 6.—Hardwoods in an area of Berks-Weikert complex, 25 to 75 percent slopes.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded.

This soil is poorly suited to corn, soybeans, and small grain because it is subject to erosion and is droughty. A system of conservation tillage that leaves protective amounts of crop residue on the surface, grassed waterways, and grade stabilization structures help to control erosion. The soil is well suited to no-till planting. Cover crops help to control erosion, maintain the supply of moisture and tilth, and increase the organic matter content.

This soil is fairly well suited to grasses and legumes for hay and is well suited to pasture. Orchardgrass, alfalfa, and red clover grow well. Drought is a serious hazard. Proper stocking rates, pasture rotation, and timely grazing minimize surface compaction and help to maintain good tilth and plant density.

The soil is well suited to trees. Seedling mortality is the main management concern. Special planting stock and overstocking are needed. Some replanting is generally necessary.

Because of the slope, this soil is moderately limited as a site for dwellings and for local roads and streets. The buildings should be designed so that they conform to the natural slope of the land. The roads and streets should be built on the contour. Land shaping is needed. The sides of shallow excavations can cave in unless they are reinforced. Because of a poor filtering capacity, the soil is severely limited as a site for septic tank absorption fields. The effluent can seep into ground water supplies and contaminate nearby shallow wells.

The land capability classification is IVe. The woodland ordination symbol is 4S.

BmF—Bloomfield loamy fine sand, 18 to 40 percent slopes. This moderately steep to very steep, deep, well drained soil is on side slopes in the uplands. Areas range from 5 to 50 acres in size.

In a typical profile, the surface layer is very dark grayish brown loamy fine sand about 6 inches thick. The subsurface layer is loamy sand about 26 inches thick. The upper part is dark yellowish brown, and the lower part is yellowish brown. The subsoil extends to a depth of about 65 inches. The upper part is yellowish brown, loose fine sand that has bands of dark brown, friable loamy fine sand. The lower part is dark brown, friable loamy fine sand that has thin bands of yellowish brown, loose fine sand. In some places the solum is neutral throughout. In other places the surface layer is sandy loam. In some areas the soil has more clay in the subsoil and is underlain by sandy loam below a depth of 67 to 70 inches. In other areas the slope is less than 18 or more than 40 percent.

Included with this soil in mapping are small areas of the well drained Berks, Gilpin, Weikert, and Wellston soils on the higher side slopes. These soils are not so sandy as the Bloomfield soil. Also included are small areas of severely eroded soils. Included soils make up 8 to 10 percent of the map unit.

The Bloomfield soil is moderately rapidly permeable and rapidly permeable. Available water capacity is low. Runoff is rapid. The organic matter content is moderately low in the surface layer.

Most areas of this soil are wooded. A few are used for pasture. Because of the slope and the hazard of erosion, this soil is generally unsuited to corn, soybeans, and small grain. It is fairly well suited to pasture. Orchardgrass, alfalfa, and red clover grow well. Drought is a serious hazard. Proper stocking rates, pasture rotation, and timely grazing minimize surface compaction, increase the rate of water infiltration, and help to maintain plant density.

The soil is fairly well suited to trees. The main management concerns are the erosion hazard, the equipment limitation, and seedling mortality. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. Special logging methods, such as yarding the logs uphill with a cable, may be needed. Ordinary crawler tractors and rubber-tired skidders cannot be operated safely on these slopes. Special planting stock and overstocking are needed. Some replanting is generally necessary.

Because of the slope and a poor filtering capacity, this soil is generally unsuited to dwellings, local roads and streets, and septic tank absorption fields.

The land capability classification is VIe. The woodland ordination symbol is 4R.

Bo—Bonnie silt loam, frequently flooded. This nearly level, deep, poorly drained soil is on flood plains. It is frequently flooded for long periods in winter and early spring and is subject to ponding. Areas range from 5 to 150 acres in size.

In a typical profile, the surface layer is pale brown silt loam about 7 inches thick. The underlying material to a depth of 60 inches is light brownish gray and light gray, mottled silt loam. In some places the surface layer is darker. In other places the underlying material has a higher content of clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Stendal soils on nearly level parts of the landscape or the slightly higher convex slopes. Also included are small areas of very poorly drained soils in depressions. Included soils make up about 8 to 10 percent of the map unit.

The Bonnie soil is moderately slowly permeable. The water table is near or above the surface during winter and early spring. Available water capacity is very high. Runoff is very slow. The organic matter content is moderate in the surface layer. This layer is difficult to work if it is tilled when too wet.

Most areas of this soil are wooded. Some are used for cultivated crops, hay, or pasture.

If drained, this soil is fairly well suited to corn, soybeans, and small grain. The frequent flooding is the main management concern. It generally occurs before the major crops are planted. Wetness is a limitation. Surface drains and a subsurface drainage system help to overcome the hazards of flooding and ponding and the wetness. Establishing an adequate drainage system is difficult in areas where suitable outlets are not available. Cover crops and a conservation tillage system that leaves all or part of the crop residue on the surface increase the organic matter content and improve tilth.

This soil is well suited to grasses and some legumes, such as reed canarygrass and ladino clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of wetness and frost action. Flooding and ponding are hazards. Surface drains and a subsurface drainage system help to overcome the hazards of flooding and ponding and the wetness. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth. Overgrazing also reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction, improve tilth, and help to maintain plant density.

This soil is well suited to trees. The equipment limitation, seedling mortality, the windthrow hazard, and plant competition are management concerns. Equipment should be used only during dry periods or when the ground is frozen. Water-tolerant species should be favored in timber stands. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying. Special planting stock and overstocking are needed. Some replanting is generally necessary. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

Because of the flooding, the ponding, and the moderately slow permeability, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads because of flooding, ponding, and low strength. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and ponding and improve the ability of the roads to support vehicular traffic.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

Br—Bromer silt loam. This nearly level, deep, somewhat poorly drained soil is in broad depressional areas, swales, and narrow drainageways on uplands. Areas range from 3 to 200 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil extends to a depth of about 80 inches. The upper part is brown and light gray, mottled, friable silt loam, and the lower part is gray and yellowish brown, mottled, firm silty clay loam and silty clay. In places the lower part of the solum has a lower content of coarse fragments.

Included with this soil in mapping are small areas of the moderately well drained Bedford and well drained Crider soils and the poorly drained Peoga soils that have a clayey substratum. Bedford and Crider soils are in the higher areas. Peoga soils are in the lower depressions. Included soils make up about 12 percent of the map unit.

The Bromer soil is slowly permeable. The water table is at a depth of 1 to 3 feet during the winter and early spring. Available water capacity is very high. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such a tobacco.

If drained, this soil is well suited to corn, soybeans, and small grain. Wetness is the main limitation. If suitable outlets are available, a subsurface drainage system can lower the water table. Cover crops and a conservation tillage system that leaves all or part of the crop residue on the surface increase the organic matter content and help to maintain tilth.

If drained, this soil is well suited to grasses and some legumes, such as orchardgrass and ladino clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost action. A drainage system is necessary. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Overgrazing also reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods help to prevent excessive compaction and maintain good tilth and plant density.

This soil is suitable for trees. The main management concerns are the equipment limitation and seedling mortality. Equipment should be used only during dry periods or when the ground is frozen. Water-tolerant species should be favored in timber stands. Special planting stock and overstocking are needed. Some replanting is generally necessary.

Because of the wetness, this soil is severely limited as a site for dwellings. The buildings should be constructed without basements and on raised, well compacted fill material. Subsurface drains help to lower the water table. The soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and minimizes the damage caused by frost action. Because of the wetness and the slow permeability, the soil is severely limited as a site for septic tank absorption fields. Perimeter drains are needed. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIw. The woodland ordination symbol is 4W.

Bu—Burnside silt loam, occasionally flooded. This nearly level, deep, well drained soil is on flood plains. It is occasionally flooded for brief periods in the spring. Areas range from 5 to 20 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 18

inches thick. It is yellowish brown and friable. The upper part is loam, and the lower part is channery loam. The underlying material is yellowish brown very channery loam about 23 inches thick. Below this is light brownish gray and yellowish brown sandstone bedrock. In some places the sandstone bedrock is within a depth of 36 inches. In other places the solum is less acid and is less than 16 or more than 40 inches thick. In a few areas the soil is underlain by limestone bedrock.

Included with this soil in mapping are small areas of the well drained Berks and Weikert soils on the higher parts of the landscape. These soils are not subject to flooding. Also included are the well drained Cuba and somewhat poorly drained Stendal soils in the lower areas. Cuba soils have a lower content of coarse fragments than the Burnside soil. Included soils make up 8 to 12 percent of the map unit.

The Burnside soil is moderately permeable. The water table is at a depth of 3 to 5 feet during the winter and early spring. Available water capacity is moderate. Runoff is slow. The organic matter content is moderately low in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay, pasture, or woodland. A few are used for specialty crops, such as tobacco.

This soil is well suited to corn, soybeans, and small grain. Stones may hinder tillage. Droughtiness is the main limitation. The occasional flooding is a hazard. It generally occurs before the major crops are planted. If a good surface drainage system is installed, crops can be planted after floodwaters recede.

This soil is well suited to grasses and legumes, such as orchardgrass and ladino clover, for hay or pasture. The occasional flooding is a hazard. A good surface drainage system helps to overcome this hazard. Overgrazing results in surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the flooding and the wetness, this soil is generally unsuitable as a site for dwellings, local roads and streets, and septic tank absorption fields.

The land capability classification is IIs. The woodland ordination symbol is 7A.

CaE2—Caneyville-Hagerstown silt loams, 18 to 25 percent slopes, eroded. These moderately steep, well drained soils are on side slopes in the uplands. The Caneyville soil is moderately deep, and the Hagerstown soil is deep. Areas range from 8 to 50 acres in size. They are about 58 percent Caneyville soil and 32 percent Hagerstown soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Caneyville soil, the surface layer is brown silt loam about 5 inches thick. It is mixed with a small amount of yellowish red subsoil material. The subsoil is very firm clay about 20 inches thick. The upper part is yellowish red, and the lower part is variegated yellowish red and strong brown. Below this is limestone bedrock.

In a typical profile of the Hagerstown soil, the surface layer is brown silt loam about 4 inches thick. It is mixed with a small amount of brown subsoil material. The subsoil is about 38 inches thick. The upper part is brown, firm silty clay loam, and the lower part is yellowish red and strong brown, firm and very firm silty clay and clay. Below this is limestone bedrock.

Included with these soils in mapping are small areas of the moderately well drained Bedford soils on the higher parts of the landscape. Also included are small areas of severely eroded soils, small areas where gully erosion has occurred, and areas where rock crops out. Included areas make up about 10 percent of the map unit.

The Caneyville soil is moderately slowly permeable, and the Hagerstown soil is moderately permeable. Available water capacity is low in the Caneyville soil and moderate in the Hagerstown soil. Runoff is rapid on both soils. The organic matter content is moderate in the surface layer.

Most areas are wooded. A few are pastured. Because of the slope and the hazard of erosion, these soils are generally unsuited to corn, soybeans, and small grain and are poorly suited to grasses and legumes for hay and pasture. They are suited to trees. The erosion hazard, the equipment limitation, and plant competition are the main concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. Ordinary crawler tractors and rubber-tired skidders cannot be operated safely on these slopes. Special logging methods, such as yarding the logs uphill with a cable, may be needed. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

These soils are generally unsuitable as sites for dwellings, local roads and streets, and septic tank absorption fields because of the slope and low strength. The depth to bedrock and moderately slow permeability in the Caneyville soil are additional problems.

The land capability classification is VIe. The woodland ordination symbol of the Caneyville soil is 4C, and that of the Hagerstown soil is 4R.

CdF—Caneyville-Rock outcrop complex, 25 to 50 percent slopes. This map unit occurs as areas of a steep and very steep, moderately deep, well drained Caneyville soil intermingled with areas of Rock outcrop.

The unit is on side slopes in the uplands. Areas range form 3 to 100 acres in size. They are about 75 percent Caneyville soil and 15 percent Rock outcrop. The Caneyville soil and the Rock outcrop occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Caneyville soil, the surface layer is dark brown silt loam about 2 inches thick. The subsurface layer is brown silt loam about 5 inches thick. The subsoil is dark brown, firm silty clay about 17 inches thick. Below this is limestone bedrock. In places narrow colluvial benches are near the base of the slopes. In some areas the soil is shallow or deep over limestone bedrock.

The Rock outcrop consists of exposed limestone bedrock and limestone boulders as much as 8 feet in diameter (fig. 7).

Included with this soil in mapping are small areas of the moderately well drained Bedford soils on the higher parts of the landscape and the well drained Haymond

Figure 7.—Rock outcrop in an area of Caneyville-Rock outcrop complex, 25 to 50 percent slopes.

soils in the lower drainageways. Haymond soils are less clayey than the Caneyville soil. Also included are small areas of severely eroded soils. Included soils make up about 10 percent of the map unit.

The Caneyville soil is moderately slowly permeable. Available water capacity is low. Runoff is very rapid. The organic matter content is moderate in the surface layer.

Most areas are wooded. Because of the slope and the stones, boulders, and rock outcrops, this unit is generally unsuited to corn, soybeans, and small grain and to grasses and legumes for hay and poorly suited to pasture.

The Caneyville soil is poorly suited to trees. The erosion hazard, the equipment limitation, and plant competition are the main concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. Ordinary crawler tractors and rubber-tired skidders cannot be operated safely on these slopes. Special logging methods, such as yarding the logs uphill with a cable, may be needed. Seedlings survive and grow well if competing vegetation is controlled or removed by cutting, girdling, or spraying.

Because of the slope, the depth to bedrock, low strength, and the moderately slow permeability, the Caneyville soil is generally unsuitable as a site for dwellings, local roads and streets, and septic tank absorption fields.

The land capability classification is VIIe. The woodland ordination symbol of the Caneyville soil is 4R.

CeD2—Chetwynd loam, 8 to 18 percent slopes, eroded. This moderately sloping and strongly sloping, deep, well drained soil is on high terraces. Areas range from 5 to 25 acres in size.

In a typical profile, the surface layer is brown loam about 5 inches thick. It is mixed with a small amount of strong brown subsoil material. The subsoil extends to a depth of about 80 inches. The upper part is strong brown, friable and firm loam and firm clay loam; the next part is dark brown, firm sandy clay loam and gravelly clay loam; and the lower part is reddish brown, firm gravelly clay loam. In some places the lower part of the subsoil is silty clay. In other places the slope is more than 18 percent.

Included with this soil in mapping are small areas of the well drained, moderately deep Berks soils. Also included are areas of the shallow Weikert soils on the higher parts of the landscape and small areas of severely eroded soils. Berks and Weikert soils formed in shale, siltstone, and sandstone residuum. Included soils make up about 10 percent of the map unit.

The Chetwynd soil is moderately permeable. Available water capacity is high. Runoff is very rapid. The organic matter content is moderate in the surface layer.

Most areas are wooded. A few are pastured. This soil is poorly suited to corn, soybeans, and small grain because of the slope and the hazard of erosion. A cropping system that is dominated by grasses and legumes, a system of conservation tillage that leaves protective amounts of crop residue on the surface, and grassed waterways help to prevent excessive soil loss. The soil is well suited to no-till planting. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is fairly well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay or pasture. Erosion is a severe hazard. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, and timely grazing minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the slope and the shrink-swell potential, this soil is moderately limited as a site for dwellings. The buildings should be designed so that they conform to the natural slope of the land. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling. The sides of shallow excavations can cave in unless they are reinforced. The soil is moderately limited as a site for septic tank absorption fields because of the slope. Installing the absorption field on the contour helps to overcome this limitation.

Because of the slope and frost action, this soil is moderately limited as a site for local roads and streets. Constructing the roads on the contour and land shaping help to overcome the slope. Replacing or covering the upper soil layers with suitable base material helps to prevent the damage caused by frost action.

The land capability classification is IVe. The woodland ordination symbol is 7A.

CeF—Chetwynd loam, 18 to 35 percent slopes. This moderately steep and steep, deep, well drained soil is on side slopes on high terraces adjacent to drainageways. Areas range from 3 to 40 acres in size.

In a typical profile, the surface layer is dark grayish brown loam about 4 inches thick. The subsoil extends to a depth of about 80 inches. The upper part is strong brown, friable loam; the next part is brown and yellowish red, firm clay loam; and the lower part is reddish brown and yellowish red, firm sandy clay loam. In some places the surface layer and subsoil have more silt. In other places the slope is less than 18 or more than 35 percent.

Included with this soil in mapping are small areas of the well drained Berks and Weikert soils on the higher

parts of the landscape. These soils formed in shale, siltstone, and sandstone residuum. Also included are small areas of severely eroded soils. Included soils make up about 10 percent of the map unit.

The Chetwynd soil is moderately permeable. Available water capacity is high. Runoff is very rapid. The organic matter content is moderate in the surface layer.

Most areas are wooded. Because of the slope and the hazard of erosion, this soil is generally unsuited to corn, soybeans, and small grain, is poorly suited to grasses and legumes for hay, and is only fairly well suited to pasture. Orchardgrass and red clover grow well. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, and timely grazing minimize surface compaction and help to maintain good tilth and plant density.

This soil is fairly well suited to trees. The erosion hazard, the equipment limitation, and plant competition are the main concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. Special logging methods, such as yarding the logs uphill with a cable, may be needed. Ordinary crawler tractors and rubber-tired skidders cannot be operated safely on these slopes. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the slope, this soil is generally unsuitable as a site for dwellings, local roads and streets, and septic tank absorption fields.

The land capability classification is VIe. The woodland ordination symbol is 7R.

ChB—Cincinnati silt loam, 2 to 6 percent slopes. This gently sloping, deep, well drained soil is on side slopes in the uplands. Areas range from 3 to 50 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 8 inches thick. The subsoil extends to a depth of about 80 inches. The upper part is yellowish brown, friable silt loam and firm silty clay loam; the next part is a fragipan of yellowish brown, mottled, firm and brittle silty clay loam; and the lower part is yellowish brown, mottled, friable loam and firm clay loam. In places the slope is less than 2 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Avonburg and moderately well drained Rossmoyne soils on the slightly higher rises. Also included are small areas of severely eroded soils. Included soils make up about 10 percent of the map unit.

The Cincinnati soil is moderately permeable above the fragipan and slowly permeable or moderately slowly permeable in and below the fragipan. The water table is at a depth of 2.5 to 4.0 feet in the winter and early spring. Available water capacity is moderate. Runoff is medium. The organic matter content is moderate in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

This soil is well suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are a cropping system that includes grasses and legumes, a system of conservation tillage that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to control erosion, improve or maintain tilth, and maintain the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the penetration of roots and the downward movement of water. Erosion is a hazard. Overgrazing or grazing when the soil is too wet causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

This soil is suitable as a site for dwellings without basements. Because of the wetness, it is moderately limited as a site for dwellings with basements. Dwellings with basements should be built on raised, well compacted fill material. Also, subsurface drains help to lower the water table. The soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and minimizes the damage caused by frost action. Because of the wetness and the slow permeability, the soil is severely limited as a site for septic tank absorption fields. Perimeter drains are needed. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIe. The woodland ordination symbol is 4A.

ChC2—Cincinnati silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, well drained soil is on uplands. Areas range from 3 to 40 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 6 inches thick. It is mixed with a small amount of yellowish brown subsoil material. The subsoil extends to a depth of 80 inches or more. The upper part

is yellowish brown, friable and firm silt loam; the next part is a fragipan of yellowish brown, mottled, very firm silt loam; and the lower part is yellowish brown, mottled, firm loam and clay loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Avonburg and moderately well drained Rossmoyne soils on the slightly higher rises. These soils make up about 10 percent of the map unit.

The Cincinnati soil is moderately permeable above the fragipan and slowly permeable or moderately slowly permeable in and below the fragipan. Available water capacity is moderate. Runoff is rapid. The organic matter content is moderate in the surface layer.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

This soil is fairly well suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are a cropping system that is dominated by grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to control erosion, improve or maintain tilth, and maintain the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the penetration of roots and the downward movement of water. Erosion is a hazard. Overgrazing or grazing when the soil is wet causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the slope and the wetness, this soil is moderately limited as a site for dwellings. The buildings should be designed so that they conform to the natural slope of the land. Subsurface drains help to lower the water table. The soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and helps to prevent the damage caused by frost action. Because of the wetness and the slow permeability, the soil is severely limited as a site for septic tank absorption fields. Perimeter drains help to lower the water table. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

CoB—Crider silt loam, 2 to 6 percent slopes. This gently sloping, deep, well drained soil is in the uplands. Areas range from about 3 to 500 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 8 inches thick. The subsoil extends to a depth of about 80 inches. The upper part is dark yellowish brown, firm silt loam; the next part is dark brown, firm silty clay loam and silt loam; and the lower part is yellowish red, very firm clay. In some places the soil is underlain by thin strata of sand or has chert fragments on the surface. In other places the slope is more than 6 percent.

Included with this soil in mapping are small areas of the moderately well drained Bedford and well drained Frederick and Hagerstown soils. Bedford soils are in landscape positions similar to those of the Crider soil. Frederick and Hagerstown soils are in the slightly lower areas. Also included are small areas of severely eroded soils. Included soils make up about 12 percent of the map unit.

The Crider soil is moderately permeable. Available water capacity is high. Runoff is medium. The organic matter content is moderate in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few areas are wooded or are used for specialty crops, such as orchard crops and tobacco.

This soil is well suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are cropping systems that include grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface (fig. 8), terraces, diversions, grassed waterways, and grade stabilization structures. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay or pasture. Erosion is a hazard. Overgrazing causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, and timely grazing minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is suitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads and streets because of low strength. Strengthening or replacing the base with better suited

Figure 8.—An example of conservation tillage in an area of Crider silt loam, 2 to 6 percent slopes. Corn is being grown in a cover crop of wheat.

material improves the ability of the roads and streets to support vehicular traffic.

The land capability classification is IIe. The woodland ordination symbol is 7A.

CoC2—Crider silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, well drained soil is on uplands. Areas range from about 3 to 350 acres in size.

In a typical profile, the surface layer is dark yellowish brown silt loam about 6 inches thick. It is mixed with a small amount of strong brown subsoil material. The subsoil extends to a depth of about 80 inches. The upper part is strong brown, firm silty clay loam; the next part is reddish brown, very firm silty clay; and the lower part is red, very firm clay. In some places the silty material is less than 20 inches thick. In other places the soil is underlain by thin strata of sand or has chert fragments on the surface. In some areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the moderately well drained Bedford soils on the higher parts of the landscape and the well drained Frederick and Hagerstown soils on the lower parts. Frederick soils have more clay in the solum than the Crider soil, and Hagerstown soils have a thinner solum. Also included are small areas of severely eroded soils. Included soils make up about 12 percent of the map unit.

The Crider soil is moderately permeable. Available water capacity is high. Runoff is rapid. The organic matter content is moderate in the surface layer.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as orchard crops and tobacco.

Because of the slope and the hazard of erosion, this soil is only fairly well suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are a cropping system that includes grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface (fig. 9), terraces, diversions, grassed waterways, and grade stabilization structures. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay or pasture (fig. 10). Erosion is a hazard. Overgrazing causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, and timely grazing minimize surface compaction and help to maintain good tilth and plant density.

Figure 9.—No-till corn in an area of Crider silt loam, 6 to 12 percent slopes, eroded.

Figure 10.—Hay in an area of Crider silt loam, 6 to 12 percent slopes, eroded.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because of the slope, this soil is moderately limited as a site for dwellings and septic tank absorption fields. The buildings should be designed so that they conform to the natural slope of the land. The absorption fields should be installed on the contour. The soil is severely limited as a site for local roads and streets because of low strength. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic.

The land capability classification is IIIe. The woodland ordination symbol is 7A.

CoD2—Crider silt loam, 12 to 18 percent slopes, eroded. This strongly sloping, deep, well drained soil is in the uplands. Areas range from about 3 to 40 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 6 inches thick. It is mixed with a small amount of strong brown subsoil material. The subsoil extends to a depth of about 80 inches. The upper part is strong brown, firm silty clay loam, and the lower part is yellowish red, very firm clay. In some areas the silty material is less than 20 inches thick. In some places the soil is underlain by thin strata of sand or has chert fragments on the surface. In other places the slope is less than 12 or more than 18 percent.

Included with this soil in mapping are small areas of the moderately well drained Bedford soils on the higher parts of the landscape and the well drained Frederick and Hagerstown soils on the lower parts. Frederick and Hagerstown soils have more clay in the subsoil than the Crider soil. Included soils make up about 12 percent of the map unit.

The Crider soil is moderately permeable. Available water capacity is high. Runoff is very rapid. The organic matter content is moderate in the surface layer.

Most areas of this soil are used for hay and pasture. Some are wooded or are used for cultivated crops.

Because of the slope and the hazard of erosion, this soil is poorly suited to corn, soybeans, and small grain. A cropping system that is dominated by grasses and legumes, a system of conservation tillage that leaves protective amounts of crop residue on the surface, and grassed waterways help to prevent excessive soil loss. The soil is well suited to no-till planting. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is fairly well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay and is well suited to pasture. Erosion is a severe hazard. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, and timely grazing minimize surface compaction and help to maintain good tilth and plant density.

This soil is fairly well suited to trees. The erosion hazard, the equipment limitation, and plant competition are the main concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. During wet periods, roads tend to be slippery and ruts form readily. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the slope, this soil is severely limited as a site for dwellings and septic tank absorption fields. The buildings should be designed so that they conform to the natural slope of the land. The absorption fields should be installed on the contour. The soil is severely limited as a site for local roads and streets because of low strength and the slope. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Constructing the roads on the contour and land shaping help to overcome the slope.

The land capability classification is IVe. The woodland ordination symbol is 7R.

CrC3—Crider silty clay loam, 6 to 12 percent slopes, severely eroded. This moderately sloping, deep, well drained soil is on side slopes adjacent to drainageways in the uplands. Areas range from 3 to 30 acres in size.

In a typical profile, the surface layer is yellowish brown silty clay loam about 5 inches thick. It is mixed with a small amount of strong brown subsoil material. The subsoil extends to a depth of about 80 inches. The upper part is strong brown, firm silty clay loam; the next part is yellowish red, firm silty clay loam; and the lower part is red, firm silty clay and clay. In places the depth to bedrock is less than 60 inches. In some areas chert fragments are on the surface. In other areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the moderately well drained Bedford soils on the higher parts of the landscape and the well drained Frederick and Hagerstown soils on the lower parts. Frederick and Hagerstown soils have more clay in the subsoil than the Crider soil. Also included are small areas where gully erosion has occurred. Included soils make up about 12 percent of the map unit.

The Crider soil is moderately permeable. Available water capacity is high. Runoff is rapid. The organic matter content is low in the surface layer.

Most areas of this soil are used for pasture. Some are used for cultivated crops. A few are wooded.

Because of the slope and a severe hazard of erosion, this soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are cropping systems that are dominated by grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface, and grassed waterways. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is fairly well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay and is well suited to pasture. Erosion is a severe hazard. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because of the slope, this soil is moderately limited as a site for dwellings and septic tank absorption fields. The buildings should be designed so that they conform to the natural slope of the land. The absorption fields should be installed on the contour. The soil is severely limited as a site for local roads and streets because of low strength. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic.

The land capability classification is IVe. The woodland ordination symbol is 7A.

CrD3—Crider silty clay loam, 12 to 18 percent slopes, severely eroded. This strongly sloping, deep, well drained soil is on side slopes in the uplands. Areas range from 3 to 30 acres in size.

In a typical profile, the surface layer is dark brown silty clay loam about 3 inches thick. It is mixed with some strong brown subsoil material. The subsoil extends to a depth of about 80 inches. The upper part is strong brown, firm silty clay loam; the next part is variegated red, yellowish brown, and strong brown, very firm silty clay; and the lower part is variegated red and strong brown, very firm clay. In places the slope is less than 12 percent. In areas of karst topography, chert fragments are on the surface.

Included with this soil in mapping are small areas of the moderately well drained Bedford soils on the higher parts of the landscape and the well drained Frederick and Hagerstown soils on the lower parts. Frederick and Hagerstown soils have more clay in the subsoil than the Crider soil. Included soils make up about 10 percent of the map unit.

The Crider soil is moderately permeable. Available water capacity is high. Runoff is very rapid. The organic matter content is moderate in the surface layer.

Most areas are used for hay and pasture. Some are wooded. A few are used for cultivated crops. Because of the slope and a severe hazard of erosion, this soil is generally unsuited to corn, soybeans, and small grain, is poorly suited to grasses and legumes for hay, and is only fairly well suited to pasture. Orchardgrass, red clover, and alfalfa grow well. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

This soil is fairly well suited to trees. The erosion hazard and the equipment limitation are the main concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. During wet periods, roads tend to be slippery and ruts form easily.

Because of the slope, this soil is severely limited as a site for dwellings and septic tank absorption fields. The buildings should be designed so that they conform to the natural slope of the land. The absorption fields should be installed on the contour. The soil is severely limited as a site for local roads and streets because of low strength and the slope. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Constructing the roads on the contour and land shaping help to overcome the slope.

The land capability classification is VIe. The woodland ordination symbol is 7R.

CsC2—Crider silt loam, karst, 4 to 12 percent slopes, eroded. This moderately sloping, deep, well drained soil is on uplands that have many sinkholes. Areas range from about 5 to 400 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 6 inches thick. It is mixed with a small amount of strong brown subsoil material. The subsoil extends to a depth of about 80 inches. In sequence downward, it is dark brown and strong brown, friable and firm silt loam and silty clay loam; reddish brown, firm silty clay; dark red, very firm clay; and variegated dark red and strong brown, very firm clay. In places chert fragments are on the surface. In a few areas the depth to bedrock is less than 60 inches.

Included with this soil in mapping are small areas of the moderately well drained Bedford soils on the higher parts of the landscape, the well drained Frederick and Hagerstown soils on the lower parts, and the well drained Haymond and somewhat poorly drained Wakeland soils at the bottom of large sinkholes. Frederick and Hagerstown soils have more clay in the subsoil than the Crider soil. Also included are a few outcrops of limestone bedrock. Included areas make up about 12 percent of the map unit.

The Crider soil is moderately permeable. Available water capacity is high. Runoff is rapid. The organic matter content is moderately low in the surface layer.

Most areas of this soil are used for cultivated crops (fig. 11). Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as orchard crops and tobacco.

Because of the slope and the hazard of erosion, this soil is only fairly well suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are a cropping system that includes grasses and legumes and a conservation tillage system that leaves protective amounts of crop residue on the surface. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay or pasture. Erosion is a hazard. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because of the slope, this soil is moderately limited as a site for dwellings and septic tank absorption fields. The buildings should be designed so that they conform to the natural slope of the land. The absorption fields should be installed on the contour. The soil is severely limited as a site for local roads and streets because of low strength. Strengthening or replacing the base with better suited

Figure 11.—An area of Crider silt loam, karst, 4 to 12 percent slopes, eroded, that is used as cropland.

material improves the ability of the roads and streets to support vehicular traffic.

The land capability classification is IIIe. The woodland ordination symbol is 7A.

CtD2—Crider-Frederick silt loams, karst, 12 to 22 percent slopes, eroded. These strongly sloping or moderately steep, deep, well drained soils are on uplands that have many sinkholes. Areas range from about 5 to 300 acres in size. They are about 65 percent Crider soil and 25 percent Frederick soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Crider soil, the surface layer is dark grayish brown silt loam about 5 inches thick. It is mixed with a small amount of dark yellowish brown subsoil material. The subsoil extends to a depth of about 80 inches. The upper part is dark yellowish brown, friable silt loam; the next part is strong brown, firm silty clay loam; and the lower part is yellowish red, firm cherty silty clay loam and red and yellowish red, very firm silty clay. In some places chert fragments are on the surface. In other places bedrock is within a depth of 60 inches. In some areas the slope is less than 12 percent.

In a typical profile of the Frederick soil, the surface layer is dark brown silt loam about 6 inches thick. It is mixed with a small amount of yellowish red subsoil material. The subsoil extends to a depth of about 80 inches. The upper part is yellowish red, firm silty clay loam; the next part is red, very firm clay; and the lower part is red, brownish yellow, and strong brown, very firm clay. In some places chert fragments are on the surface. In other places the depth to bedrock is less than 60 inches. In some areas the slope is less than 12 or more than 18 percent.

Included with these soils in mapping are small areas of the moderately well drained Bedford soils on the higher parts of the landscape and the well drained Hagerstown soils on the lower parts. Bedford soils have a fragipan. Hagerstown soils have more clay in the subsoil than the Crider soil. Also included are a few outcrops of limestone

bedrock. Included areas make up about 10 percent of the map unit.

The Crider and Frederick soils are moderately permeable. Available water capacity is high in the Crider soil and moderate in the Frederick soil. Runoff is very rapid on both soils. The organic matter content is moderately low in the surface layer.

Most areas of these soils are used for hay and pasture. Some are wooded. A few are used for cultivated crops.

Because of the slope and the hazard of erosion, these soils are poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are a cropping system that is dominated by grasses and legumes and a conservation tillage system that leaves protective amounts of crop residue on the surface. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

These soils are fairly well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay and are well suited to pasture. Erosion is a severe hazard. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

These soils are fairly well suited to trees. The erosion hazard and the equipment limitation are the main concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. During wet periods, roads tend to be slippery and ruts form easily.

Because of the slope, these soils are severely limited as sites for dwellings and septic tank absorption fields. The buildings should be designed so that they conform to the natural slope of the land. The absorption fields should be installed on the contour. The soils are severely limited as sites for local roads and streets because of low strength and the slope. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Constructing the roads on the contour and land shaping help to overcome the slope.

The land capability classification is IVe. The woodland ordination symbol of the Crider soil is 7R, and that of the Frederick soil is 4R.

Cu—Cuba silt loam, frequently flooded. This nearly level, deep, well drained soil is on flood plains. It is frequently flooded for brief periods in winter and early spring. Areas range from 5 to 300 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 12 inches thick. The subsoil is dark yellowish brown and yellowish brown, friable silt loam about 34 inches thick. The underlying material to a depth of 60 inches is yellowish brown, mottled silt loam. In some places the soil is less acid. In other places the subsoil has more clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Bartle and moderately well drained Pekin soils on the higher terraces, the well drained Burnside soils on the slightly higher parts of the landscape, and the somewhat poorly drained Stendal soils on the lower parts. Burnside soils have a high content of coarse fragments. Also included are small areas of poorly drained soils in depressions. Included soils make up 10 to 15 percent of the map unit.

The Cuba soil is moderately permeable. Available water capacity is very high. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

This soil is well suited to corn, soybeans, and small grain. Wetness is the main limitation. The frequent flooding is a hazard. It generally occurs before the major crops are planted. A conservation tillage system that leaves protective amounts of crop residue on the surface, cover crops, and green manure crops help to maintain or improve tilth and increase the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost action. The flooding is a hazard. A good surface drainage system helps to overcome this hazard. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads and streets because of flooding and frost action. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by floodwater and frost action.

The land capability classification is IIw. The woodland ordination symbol is 8A.

Cw—Cuba silt loam, occasionally flooded. This nearly level, deep, well drained soil is on flood plains. It is occasionally flooded for brief periods in the spring. Areas range from 5 to 50 acres in size.

In a typical profile, the surface layer is brown silt loam about 10 inches thick. The subsoil is yellowish brown, friable silt loam about 15 inches thick. The underlying material to a depth of 60 inches is yellowish brown, mottled silt loam. Some areas are frequently flooded.

Included with this soil in mapping are small areas of the somewhat poorly drained Bartle and moderately well drained Pekin soils on the higher terraces, the well drained Burnside soils on the slightly higher parts of the landscape, and the somewhat poorly drained Stendal soils on the lower parts. Burnside soils have a high content of coarse fragments. Also included are small areas of poorly drained soils in depressions. Included soils make up 10 to 15 percent of the map unit.

The Cuba soil is moderately permeable. Available water capacity is very high. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

This soil is well suited to corn, soybeans, and small grain. The occasional flooding is a hazard. It generally occurs before the major crops are planted. Watershed dam structures provide some protection from floodwater. A surface drainage system helps to remove the floodwater. A conservation tillage system that leaves protective amounts of crop residue on the surface, cover crops, and green manure crops help to maintain or improve tilth and increase the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of wetness and frost action. The flooding is a hazard. A good surface drainage system helps to overcome this hazard. Overgrazing causes surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, and timely grazing minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees (fig. 12). No major hazards or limitations affect planting or harvesting.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads and streets because of the flooding and frost action. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by floodwater and frost action.

The land capability classification is IIw. The woodland ordination symbol is 8A.

Figure 12.—A stand of young walnut trees on Cuba silt loam, occasionally flooded.

In a typical profile, the surface layer is brown silt loam about 10 inches thick. The subsoil is yellowish brown, friable silt loam about 15 inches thick. The underlying material to a depth of 60 inches is yellowish brown, mottled silt loam. Some areas are frequently flooded.

Included with this soil in mapping are small areas of the somewhat poorly drained Bartle and moderately well drained Pekin soils on the higher terraces, the well drained Burnside soils on the slightly higher parts of the landscape, and the somewhat poorly drained Stendal soils on the lower parts. Burnside soils have a high content of coarse fragments. Also included are small areas of poorly drained soils in depressions. Included soils make up 10 to 15 percent of the map unit.

The Cuba soil is moderately permeable. Available water capacity is very high. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

This soil is well suited to corn, soybeans, and small grain. The occasional flooding is a hazard. It generally occurs before the major crops are planted. Watershed dam structures provide some protection from floodwater. A surface drainage system helps to remove the floodwater. A conservation tillage system that leaves protective amounts of crop residue on the surface, cover crops, and green manure crops help to maintain or improve tilth and increase the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of wetness and frost action. The flooding is a hazard. A good surface drainage system helps to overcome this hazard. Overgrazing causes surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, and timely grazing minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees (fig. 12). No major hazards or limitations affect planting or harvesting.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads and streets because of the flooding and frost action. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by floodwater and frost action.

The land capability classification is IIw. The woodland ordination symbol is 8A.

Figure 12.—A stand of young walnut trees on Cuba silt loam, occasionally flooded.

DbA—Dubois silt loam, 0 to 2 percent slopes. This nearly level, deep, somewhat poorly drained soil is on lake plains. Areas range from 3 to 300 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 8 inches thick. The subsoil extends to a depth of about 72 inches. The upper part is brown and yellowish brown, mottled, friable silt loam; the next part is a fragipan of light brownish gray, mottled, firm and brittle silty clay loam; and the lower part is yellowish brown, mottled, firm silt loam. The underlying material to a depth of 80 inches is yellowish brown, mottled, stratified silt loam and silty clay loam.

Included with this soil in mapping are small areas of the moderately well drained Haubstadt and well drained Otwell soils on the steeper side slopes. Also included are small areas of very poorly drained soils in depressions. Included soils make up about 10 percent of the map unit.

The Dubois soil is moderately permeable above the fragipan and very slowly permeable in and below the fragipan. The water table is at a depth of 1 to 3 feet during the winter and early spring. Available water capacity is moderate. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

If drained, this soil is well suited to corn, soybeans, and small grain. Wetness is the main limitation. If suitable outlets are available, a subsurface drainage system can lower the water table. Green manure crops and a conservation tillage system that leaves all or part of the crop residue on the surface increase the organic matter content and help to maintain tilth.

If drained, this soil is well suited to grasses and some legumes, such as orchardgrass and ladino clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of wetness and frost action. A drainage system is necessary. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Overgrazing also reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods help to prevent compaction and maintain good tilth and plant density.

This soil is fairly well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is severely limited as a site for dwellings because of the wetness and as a site for septic tank absorption fields because of the wetness and the very slow permeability. Subsurface drains help to lower the water table. Perimeter drains are needed on sites for septic tank absorption fields. Providing suitable fill material improves the ability of the field to absorb the effluent. The soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and reduces the potential for frost action.

The land capability classification is IIw. The woodland ordination symbol is 3A.

EIB—Elkinsville silt loam, 2 to 6 percent slopes. This gently sloping, deep, well drained soil is on terraces. Areas range from 4 to 12 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 39 inches thick. The upper part is strong brown, firm silty clay loam, and the lower part is yellowish brown, firm clay loam. The underlying material to a depth of 60 inches is yellowish brown, stratified silty clay loam and silt loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Bartle soils on the higher parts of the landscape. These soils make up about 10 percent of the map unit.

The Elkinsville soil is moderately permeable. Available water capacity is high. Runoff is medium. The organic matter content is moderately low in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

This soil is well suited to corn, soybeans, and small grain. If cultivated crops are grown, measures to control erosion are needed. Examples are a conservation tillage system that leaves protective amounts of crop residue on the surface. The cover of crop residue minimizes crusting and increases the rate of water infiltration. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay or pasture. Erosion is a hazard. Overgrazing causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the shrink-swell potential, this soil is moderately limited as a site for dwellings. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling. The soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited

material improves the ability of the roads and streets to support vehicular traffic and helps to prevent the damage caused by frost action. The soil is suitable as a site for septic tank absorption fields.

The land capability classification is IIe. The woodland ordination symbol is 5A.

EIC2—Elkinsville silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, well drained soil is on terraces. Areas range from 4 to 15 acres in size.

In a typical profile, the surface layer is dark yellowish brown silt loam about 6 inches thick. It is mixed with a small amount of strong brown subsoil material. The subsoil is about 36 inches thick. It is strong brown and firm. The upper part is silty clay loam, and the lower part is clay loam. The underlying material to a depth of 60 inches is brown loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Bartle soils on the higher parts of the landscape. These soils make up about 10 percent of the map unit.

The Elkinsville soil is moderately permeable. Available water capacity is high. Runoff is rapid. The organic matter content is moderately low in the surface layer.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

Because of the slope and the hazard of erosion, this soil is only fairly well suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are a cropping system that includes grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay or pasture. Erosion is a hazard. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the shrink-swell potential and the slope, this soil is moderately limited as a site for dwellings. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling. The buildings should be designed so that they conform to the natural slope of the land. The soil is moderately limited as a site for septic tank absorption fields because of the slope. Installing the absorption field on the contour helps to overcome this limitation.

Because of the low strength and frost action, this soil is severely limited as a site for local roads and streets. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and helps to prevent the damage caused by frost action.

The land capability classification is IIIe. The woodland ordination symbol is 5A.

FwD2—Frederick silt loam, karst, 12 to 22 percent slopes, eroded. This strongly sloping or moderately steep, deep, well drained soil is on uplands that have many sinkholes. Areas range from about 3 to 130 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 6 inches thick. It is mixed with a small amount of yellowish red subsoil material. The subsoil extends to a depth of about 80 inches. The upper part is yellowish red, firm silty clay loam; the next part is red, very firm silty clay and clay; and the lower part is red, brownish yellow, and strong brown, very firm clay. In places the surface layer is cherty silt loam. In some areas the silty material is less than 15 inches thick.

Included with this soil in mapping are small areas of the well drained Baxter Variant and Crider soils on the slightly higher parts of the landscape. Baxter Variant soils have a high content of chert fragments. Crider soils have more silt than the Frederick soil. Included soils make up about 12 percent of the map unit.

The Frederick soil is moderately permeable. Available water capacity also is moderate. Runoff is very rapid. The organic matter content is moderate in the surface layer.

Most areas of this soil are used for hay and pasture. Some are wooded. A few are used for cultivated crops.

Because of the slope and the hazard of erosion, this soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, measures to control erosion are needed. Examples are cropping systems that are dominated by grasses and legumes and a conservation tillage system that leaves protective amounts of crop residue on the surface. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is fairly well suited to grasses and some legumes, such as orchardgrass and red clover, for hay and is well suited to pasture. Erosion is a severe hazard. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

This soil is fairly well suited to trees. The erosion hazard and the equipment limitation are the main concerns in managing the wooded areas. Locating

logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. During wet periods, roads tend to be slippery and ruts form easily.

Because of the slope, this soil is severely limited as a site for dwellings and septic tank absorption fields. The buildings should be designed so that they conform to the natural slope of the land. The absorption fields should be installed on the contour. Because of low strength and the slope, the soil is severely limited as a site for local roads and streets. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Constructing the roads on the contour and land shaping help to overcome the slope.

The land capability classification is IVe. The woodland ordination symbol is 4R.

FxC2—Frederick-Baxter Variant complex, karst, 4 to 12 percent slopes, eroded. These moderately sloping, deep, well drained soils are on uplands that have many sinkholes. Areas range from 4 to 150 acres in size. They are about 60 percent Frederick soil and 30 percent Baxter Variant soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Frederick soil, the surface layer is dark brown silt loam about 7 inches thick. It is mixed with a small amount of yellowish red subsoil material. The subsoil extends to a depth of about 80 inches. In sequence downward, it is yellowish red, firm silty clay loam; red, very firm silty clay loam and cherty clay; red and strong brown, very firm cherty clay; and red, yellowish brown, and pale brown, firm cherty silty clay loam. In some places the silty material is less than 15 inches thick. In other places the slope is more than 12 percent.

In a typical profile of the Baxter Variant soil, the surface layer is dark brown very cherty silt loam about 7 inches thick. It is mixed with a small amount of yellowish brown subsoil material. The subsoil extends to a depth of 80 inches or more. The upper part is yellowish brown, friable very cherty silt loam; the next part is red, very firm cherty and very cherty clay; and the lower part is yellowish red and reddish brown, very firm and firm cherty clay loam and cherty sandy clay loam. In places the slope is less than 6 percent.

Included with these soils in mapping are small areas of the well drained Crider soils on the slightly higher parts of the landscape. These included soils contain more silt in the upper part than the Frederick and Baxter Variant soils. They make up about 10 percent of the map unit.

The Frederick and Baxter Variant soils are moderately permeable. Available water capacity is moderate in the Frederick soil and moderately low in the Baxter Variant soil. Runoff is rapid on both soils. The organic matter content is moderate in the surface layer.

Most areas of these soils are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

Because of the slope and the hazard of erosion, these soils are only fairly well suited to corn, soybeans, and small grain. If cultivated crops are grown, measures to control erosion are needed. Examples are a cropping system that includes grasses and legumes and a conservation tillage system that leaves protective amounts of crop residue on the surface. The soils are well suited to no-till planting. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

These soils are well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay or pasture. Erosion is a hazard. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

These soils are well suited to trees. The equipment limitation and plant competition are the main concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. During wet periods, roads tend to be slippery and ruts form easily. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the slope and the shrink-swell potential, these soils are moderately limited as sites for dwellings. The buildings should be designed so that they conform to the natural slope of the land. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling.

These soils are severely limited as sites for local roads and streets because of low strength, the slope, and the shrink-swell potential. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and reduces the shrink-swell potential. Constructing the roads on the contour and land shaping help to overcome the slope.

Because of the slope and the moderate permeability, these soils are severely limited as sites for septic tank absorption fields. Installing the absorption fields on the contour helps to overcome the slope. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIIe. The woodland ordination symbol of the Frederick soil is 4C, and that of the Baxter Variant soil is 5A.

GlD2—Gilpin silt loam, 12 to 18 percent slopes, eroded. This strongly sloping, moderately deep, well

drained soil is on side slopes in the uplands. Areas range from 3 to 25 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 5 inches thick. It is mixed with a small amount of yellowish brown subsoil material. The subsoil is about 26 inches thick. It is yellowish brown and friable. The upper part is silt loam, and the lower part is channery and very channery silt loam. The underlying material is yellowish brown very channery silt loam about 9 inches thick. Brown and yellowish brown, hard sandstone bedrock is at a depth of about 40 inches. In some places, the solum is more than 36 inches thick and the depth to bedrock may be more than 40 inches. In other places the slope is less than 12 or more than 18 percent.

Included with this soil in mapping are small areas of the well drained Zanesville soils on the higher parts of the landscape. These soils have a fragipan. Also included are small areas where gully erosion has occurred. Included soils make up 10 to 15 percent of the map unit.

The Gilpin soil is moderately permeable. Available water capacity is low. Runoff is very rapid. The organic matter is moderately low in the surface layer.

Most areas of this soil are wooded. A few are used for pasture.

Because of the slope and the hazard of erosion, this soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are a cropping system that is dominated by grasses and legumes and a conservation tillage system that leaves protective amounts of crop residue on the surface. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is fairly well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay and is well suited to pasture. Erosion is a severe hazard. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

This soil is fairly well suited to trees. The erosion hazard, the equipment limitation, and plant competition are the main concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. During wet periods, roads tend to be slippery and ruts form easily. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the slope, this soil is severely limited as a site for dwellings and for local roads and streets. The buildings should be designed so that they conform to the natural slope of the land. The roads should be built on the contour. Land shaping is needed. The soil is severely limited as a site for septic tank absorption fields because of the depth to bedrock and the slope. Installing the absorption field on the contour helps to overcome the slope. Overcoming the depth to bedrock is quite expensive.

The land capability classification is IVe. The woodland ordination symbol is 4R.

GnF—Gilpin-Berks loams, 18 to 50 percent slopes. These moderately steep to very steep, moderately deep, well drained soils are on side slopes in the uplands. Areas range from 10 to 50 acres in size. They are about 50 percent Gilpin soil and 35 percent Berks soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Gilpin soil, the surface layer is dark grayish brown loam about 3 inches thick. The subsurface layer is yellowish brown channery loam about 3 inches thick. The subsoil is about 24 inches thick. The upper part is light yellowish brown, friable channery loam; the next part is yellowish brown, friable loam; and the lower part is strong brown, firm silty clay loam. Fine grained sandstone bedrock is at a depth of about 30 inches. In places, the solum is more than 36 inches thick and the depth to bedrock is more than 40 inches.

In a typical profile of the Berks soil, the surface layer is dark grayish brown loam about 4 inches thick. The subsoil is yellowish brown, friable channery loam about 20 inches thick. Soft, fine grained sandstone bedrock is at a depth of about 24 inches. It is underlain by hard sandstone bedrock.

Included with these soils in mapping are small areas of the well drained Wellston and Zanesville soils on the higher ridgetops and the well drained Chetwynd soils on the lower side slopes. Also included are small areas of the moderately well drained Ebal soils, small areas of severely eroded soils, and small areas where gully erosion has occurred. Ebal soils are in landscape positions similar to those of the Gilpin and Berks soils. Included soils make up about 15 percent of the map unit.

The Gilpin soil is moderately permeable, and the Berks soil is moderately permeable or moderately rapidly permeable. Available water capacity is low in the Gilpin soil and very low in the Berks soil. Runoff is very rapid on both soils. The organic matter content is moderately low in the surface layer.

Most areas of these soils are wooded. A few are used for pasture. Because of the slope, the hazard of erosion, and the low or very low available water capacity, these soils are generally unsuited to corn, soybeans, and small grain and to grasses and legumes for hay and are poorly suited to pasture. Orchardgrass, red clover, and alfalfa grow well. Erosion is a severe hazard. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface

compaction and help to maintain good tilth and plant density.

These soils are fairly well suited to trees. The erosion hazard, the equipment limitation, seedling mortality, and plant competition are concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. Ordinary crawler tractors and rubber-tired skidders cannot be operated safely on these slopes. Special logging methods, such as yarding the logs uphill with a cable, may be needed to minimize the use of equipment. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying. Special planting stock and overstocking are needed. Some replanting is generally necessary.

These soils are generally unsuitable as sites for dwellings, local roads and streets, and septic tank absorption fields because of the slope and the depth to bedrock.

The land capability classification is VIIe. The woodland ordination symbol of the Gilpin soil is 4R, and that of the Berks soil is 4F.

GpF—Gilpin-Berks-Ebal complex, 18 to 50 percent slopes. These moderately steep to very steep soils are on side slopes in the uplands. The Gilpin and Berks soils are well drained and moderately deep, and the Ebal soil is moderately well drained and deep. Areas range from 10 to 50 acres in size. They are about 55 percent Gilpin soil, 30 percent Berks soil, and 10 percent Ebal soil. The three soils occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Gilpin soil, the surface layer is dark grayish brown loam about 3 inches thick. The subsurface layer is yellowish brown channery loam about 3 inches thick. The subsoil is about 24 inches thick. The upper part is light yellowish brown, friable channery loam; the next part is yellowish brown, friable loam; and the lower part is strong brown, firm clay loam. Yellowish brown, soft, fine grained sandstone bedrock is at a depth of about 30 inches. In places, the solum is more than 36 inches thick and the depth to bedrock is more than 40 inches.

In a typical profile of the Berks soil, the surface layer is dark grayish brown loam about 4 inches thick. The subsoil is yellowish brown, friable channery loam about 20 inches thick. Soft, fine grained sandstone bedrock is at a depth of about 24 inches. It is underlain by hard sandstone bedrock.

In a typical profile of the Ebal soil, the surface layer is dark brown silt loam about 4 inches thick. The subsoil extends to a depth of about 64 inches. The upper part is yellowish brown, friable silt loam; the next part is brown, firm and very firm channery silty clay loam, channery silty clay, and clay; and the lower part is yellowish brown, mottled clay. Below this is gray, mottled clayey shale.

Included with these soils in mapping are small areas of the well drained Chetwynd soils on the lower side slopes and the well drained Wellston and Zanesville soils on the higher ridgetops. Chetwynd soils are sandier than the Gilpin, Berks, and Ebal soils. Also included are small areas of severely eroded soils and small areas where gully erosion has occurred. Included soils make up about 5 percent of the map unit.

The Gilpin soil is moderately permeable, the Berks soil is moderately permeable or moderately rapidly permeable, and the Ebal soil is moderately slowly permeable in the upper part and very slowly permeable in the lower part. Available water capacity is low in the Gilpin soil, very low in the Berks soil, and moderate in the Ebal soil. Runoff is very rapid on all three soils. The organic matter content is low in the surface layer.

Most areas of these soils are wooded. A few are used for pasture. Because of the slope and the hazard of erosion, these soils are generally unsuited to corn, soybeans, and small grain and to grasses and legumes for hay and are poorly suited to pasture. Orchardgrass, red clover, and alfalfa grow well. Erosion and drought are hazards. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

These soils are fairly well suited to trees. The erosion hazard, the equipment limitation, seedling mortality, the windthrow hazard, and plant competition are concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. Rubber-tired skidders cannot be operated safely on these slopes. Special logging methods, such as yarding the logs uphill with a cable, may be needed to minimize the use of equipment. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying. Special planting stock and overstocking are needed. Some replanting is generally necessary. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

These soils are generally unsuitable as sites for dwellings, local roads and streets, and septic tank absorption fields because of the slope and the depth to bedrock.

The land capability classification is VIIe. The woodland ordination symbol of the Gilpin and Ebal soils is 4R, and that of the Berks soil is 4F.

HaC2—Hagerstown silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, well drained soil is on uplands. Areas range from about 3 to 100 acres in size.

In a typical profile, the surface layer is dark yellowish brown silt loam about 6 inches thick. It is mixed with a

small amount of dark brown subsoil material. The subsoil is about 39 inches thick. The upper part is dark brown, firm silty clay loam; the next part is yellowish red, very firm silty clay; and the lower part is reddish brown, very firm clay. Below this is limestone bedrock. In some places the silty material is less than 20 inches thick. In other places the slope is less than 6 percent.

Included with this soil in mapping are small areas of the moderately well drained Bedford soils on the higher parts of the landscape. These soils have less clay in the subsoil than the Hagerstown soil. They make up about 12 percent of the map unit.

The Hagerstown soil is moderately permeable. Available water capacity also is moderate. Runoff is rapid. The organic matter content is moderate in the surface layer.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

Because of the slope and the hazard of erosion, this soil is fairly well suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are a cropping system that includes grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures. The soil is well suited to no-till farming. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. Overgrazing causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, and timely grazing minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. The equipment limitation is moderate. During wet periods, logging roads tend to be slippery and ruts form easily. The roads should be built on gentle grades, and water should be removed with water bars, culverts, and drop structures.

Because of the shrink-swell potential and the slope, this soil is moderately limited as a site for dwellings without basements. It is moderately limited as a site for dwellings with basements because of the depth to bedrock and the slope. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling. Overcoming the depth to bedrock is quite expensive. As a result, dwellings without basements should be considered. The buildings should be designed so that they conform to the natural slope of the land.

This soil is severely limited as a site for local roads and streets because of low strength. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic.

Because of the depth to bedrock, the moderate permeability, and the slope, this soil is moderately limited as a site for septic tank absorption fields. Overcoming the depth to bedrock is quite expensive. Providing suitable fill material improves the ability of the field to absorb the effluent. Installing the field on the contour helps to overcome the slope.

The land capability classification is IIIe. The woodland ordination symbol is 4S.

HcC3—Hagerstown silty clay loam, 6 to 12 percent slopes, severely eroded. This moderately sloping, deep, well drained soil is on uplands. Areas range from about 3 to 75 acres in size.

In a typical profile, the surface layer is red silty clay loam about 7 inches thick. It is mixed with a small amount of red subsoil material. The subsoil is red, mottled, very firm clay about 38 inches thick. Below this is limestone bedrock. In some areas the silty material is less than 20 inches thick. Some areas have sinkholes. In places the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the moderately well drained Bedford soils on the higher parts of the landscape. Also included are small areas where gully erosion has occurred. Included soils make up about 12 percent of the map unit.

The Hagerstown soil is moderately permeable. Available water capacity also is moderate. Runoff is rapid. The organic matter content is low in the surface layer.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

Because of the slope and a severe hazard of erosion, this soil is poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are a cropping system that is dominated by grasses and legumes, a system of conservation tillage that leaves protective amounts of the crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures. The soil is well suited to no-till planting. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is fairly well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay and is well suited to pasture. Erosion is a severe hazard. Overgrazing causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. The equipment limitation is moderate. During wet periods, logging roads

tend to be slippery and ruts form easily. The roads should be built on gentle grades, and water should be removed with water bars, out-sloping road surfaces, culverts, and drop structures.

Because of the shrink-swell potential and the slope, this soil is moderately limited as a site for dwellings without basements. It is moderately limited as a site for dwellings with basements because of the depth to bedrock and the slope. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling. Overcoming the depth to bedrock is quite expensive. As a result, dwellings without basements should be considered. The buildings should be designed so that they conform to the natural slope of the land.

This soil is severely limited as a site for local roads and streets because of low strength. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic.

Because of the depth to bedrock, the moderate permeability, and the slope, this soil is moderately limited as a site for septic tank absorption fields. Overcoming the depth to bedrock is quite expensive. Providing suitable fill material improves the ability of the field to absorb the effluent. Installing the field on the contour helps to overcome the slope.

The land capability classification is IVe. The woodland ordination symbol is 4S.

HeD2—Hagerstown-Caneyville silt loams, 12 to 18 percent slopes, eroded. These strongly sloping, well drained soils are on side slopes in the uplands. The Hagerstown soil is deep, and the Caneyville soil is moderately deep. Areas range from 8 to 60 acres in size. They are about 60 percent Hagerstown soil and 30 percent Caneyville soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Hagerstown soil, the surface layer is dark brown silt loam about 5 inches thick. It is mixed with a small amount of strong brown subsoil material. The subsoil is about 39 inches thick. The upper part is strong brown, firm silty clay loam, and the lower part is red and strong brown, firm and very firm clay. Below this is limestone bedrock. In some places the silty material is more than 20 inches thick. In other places chert fragments are on the surface. In some areas the slope is more than 18 percent.

In a typical profile of the Caneyville soil, the surface layer is dark brown silt loam about 5 inches thick. It is mixed with a small amount of strong brown subsoil material. The subsoil is about 25 inches thick. The upper part is strong brown, firm silty clay loam, and the lower part is yellowish red, very firm silty clay and clay. Below this is limestone bedrock. In some places the silty material is more than 20 inches thick. In other places chert fragments are on the surface. In some areas the bedrock crops out. In other areas the slope is less than 12 or more than 18 percent.

Included with these soils in mapping are small areas of the moderately well drained Bedford soils on the higher parts of the landscape. Also included are outcrops of limestone bedrock. Included areas make up about 10 percent of the map unit.

The Hagerstown soil is moderately permeable, and the Caneyville soil is moderately slowly permeable. Available water capacity is moderate in the Hagerstown soil and low in the Caneyville soil. Runoff is very rapid on both soils. The organic matter content is moderate in the surface layer.

Most areas of these soils are wooded. Some are used for pasture. A few are used for cultivated crops.

Because of the slope and the hazard of erosion, these soils are poorly suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are a cropping system that is dominated by grasses and legumes and a conservation tillage system that leaves protective amounts of crop residue on the surface. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

These soils are fairly well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay and are well suited to pasture. Erosion is a severe hazard. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

These soils are well suited to trees. The erosion hazard, the equipment limitation, and plant competition are the main concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. During wet periods, roads tend to be slippery and ruts form easily. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the slope of both soils and the depth to bedrock in the Caneyville soil, these soils are severely limited as sites for dwellings. The buildings should be designed so that they conform to the natural slope of the land. Measures that overcome the depth to bedrock are quite expensive. As a result, dwellings without basements should be considered.

These soils are severely limited as sites for local roads and streets because of low strength and the slope. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Constructing the roads on the contour and land shaping help to overcome the slope.

These soils are generally unsuitable as sites for septic tank absorption fields. The slope of both soils and the depth to bedrock and moderately slow permeability in the Caneyville soil are severe limitations.

The land capability classification is IVe. The woodland ordination symbol of the Hagerstown soil is 4S, and that of the Caneyville soil is 6R.

HhB—Haubstadt silt loam, 2 to 6 percent slopes. This gently sloping, deep, moderately well drained soil is on side slopes on lake plains. Areas range from 3 to 50 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 8 inches thick. The subsoil extends to a depth of about 80 inches. In sequence downward, it is yellowish brown, friable silt loam; yellowish brown, mottled, firm silty clay loam; a fragipan of yellowish brown, mottled, firm, brittle silty clay loam; and strong brown and yellowish brown, firm silty clay loam. In some places glacial till is at a depth of about 40 inches. In other places the slope is less than 2 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Dubois soils on the lower parts of the landscape and the well drained Otwell soils on the higher parts. Included soils make up about 10 percent of the map unit.

The Haubstadt soil is slowly permeable. The water table is at a depth of 1.5 to 3.0 feet during the winter and early spring. Available water capacity is moderate. Runoff is medium. The organic matter content is moderate in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

This soil is well suited to corn, soybeans, and small grain. Measures that control erosion are needed. Examples are cropping systems that include grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the penetration of roots and the downward movement of water. Overgrazing or grazing when the soil is wet causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is fairly well suited to trees. The windthrow hazard and plant competition are the main concerns in managing the wooded areas. Carefully thinning the stands or not thinning them at all helps to prevent windthrow. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the wetness and the shrink-swell potential, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of the wetness. Building on raised, well compacted fill material helps to overcome the wetness. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and helps to prevent the damage caused by frost action.

Because of the wetness and the slow permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains are needed. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIe. The woodland ordination symbol is 4D.

Hm—Haymond silt loam, frequently flooded. This nearly level, deep, well drained soil is on flood plains and at the bottom of large sinkholes in the uplands. It is frequently flooded for brief periods in winter and early spring. Water stands on the bottom of the sinkholes for short periods in winter and spring. Areas range from 3 to 75 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is friable silt loam about 37 inches thick. The upper part is dark yellowish brown, and the lower part is yellowish brown. The underlying material to a depth of 60 inches is yellowish brown silt loam. In a few places the soil has overwash more than 20 inches deep over buried horizons of lacustrine sediments or limestone residuum. In some areas the solum has more clay. In other areas it is less than 40 inches thick. In places it is more acid. Some areas are only occasionally flooded.

Included with this soil in mapping are small areas of the moderately well drained Bedford and well drained Crider and Hagerstown soils on the higher parts of the landscape and the somewhat poorly drained Wakeland soils in the lower drainageways. Crider and Hagerstown soils are more clayey than the Haymond soil. Included soils make up about 12 percent of the map unit.

The Haymond soil is moderately permeable. Available water capacity is very high. Runoff is slow. The organic matter content is moderate in the surface layer. This

layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

This soil is well suited to corn, soybeans, and small grain. Wetness is a limitation. The frequent flooding is a hazard. It generally occurs before the major crops are planted. If a good surface drainage system is installed, crops can be planted after floodwaters recede.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of wetness and frost action. The frequent flooding is a hazard. Overgrazing causes surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads because of flooding and frost action. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by floodwater and frost action.

The land capability classification is IIw. The woodland ordination symbol is 8A.

HrD2—Hickory silt loam, 12 to 18 percent slopes, eroded. This strongly sloping, deep, well drained soil is on uplands. Areas range from 3 to 30 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 4 inches thick. It is mixed with a small amount of yellowish brown subsoil material. The subsoil is about 46 inches thick. The upper part is yellowish brown, firm loam and clay loam, and the lower part is strong brown and yellowish brown, mottled, firm clay loam. The underlying material to a depth of 60 inches is yellowish brown, mottled clay loam. In places the subsoil has more clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Avonburg and moderately well drained Rossmoyne soils on the lower parts of the landscape. Also included are small areas where gully erosion has occurred. Included soils make up about 10 percent of the map unit.

The Hickory soil is moderately permeable. Available water capacity also is moderate. Runoff is very rapid. The organic matter content is moderately low in the surface layer.

Most areas of this soil are used for hay and pasture. Some are wooded. A few are used for cultivated crops.

Because of the slope and the hazard of erosion, this soil is poorly suited to corn, soybeans, and small grain. Measures that control erosion are needed. Examples are cropping systems that are dominated by grasses and legumes and a conservation tillage system that leaves protective amounts of crop residue on the surface. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is fairly well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay and is well suited to pasture. Erosion is a severe hazard. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

This soil is fairly well suited to trees. The erosion hazard, the equipment limitation, and plant competition are the main concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. During wet periods, roads tend to be slippery and ruts form easily. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, and spraying.

Because of the slope, this soil is severely limited as a site for dwellings and septic tank absorption fields. The buildings should be designed so that they conform to the natural slope of the land. The absorption fields should be installed on the contour. Because of low strength and the slope, the soil is severely limited as a site for local roads and streets. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Constructing the roads on the contour and land shaping help to overcome the slope.

The land capability classification is IVe. The woodland ordination symbol is 5R.

MaB—Markland silt loam, 2 to 8 percent slopes. This gently sloping, deep, well drained soil is on side slopes on broad lacustrine terraces. Areas range from 3 to 20 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 7 inches thick. The subsoil is about 23 inches thick. The upper part is yellowish brown, mottled, firm silty clay loam, and the lower part is yellowish brown, very firm silty clay. The underlying material to a depth of 60 inches is yellowish brown silty clay loam. It has thin strata of silt loam in the lower part. In a few places the slope is more than 8 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained McGary and very poorly drained Zipp soils on the lower terraces. These soils make up about 10 percent of the map unit.

The Markland soil is slowly permeable. The water table is at a depth of 3 to 6 feet during winter and early

spring. Available water capacity is moderate. Runoff is medium. The organic matter content is moderate in the surface layer.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

Because of the hazard of erosion, this soil is only fairly well suited to corn, soybeans, and small grain. A cropping system that includes grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures help to prevent excessive soil loss. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. Erosion is a hazard. Overgrazing or grazing when the soil is wet causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is fairly well suited to trees. Seedling mortality, the windthrow hazard, and plant competition are the main concerns in managing the wooded areas. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying. Special planting stock and overstocking are needed. Some replanting is generally necessary. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

Because of the shrink-swell potential, this soil is severely limited as a site for dwellings. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling. Because of low strength and the shrink-swell potential, the soil is severely limited as a site for local roads and streets. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and reduces the shrink-swell potential. The soil is severely limited as a site for septic tank absorption fields because of the wetness and the slow permeability. Perimeter drains are needed. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIIe. The woodland ordination symbol is 4C.

MgA—McGary silt loam, 0 to 2 percent slopes. This nearly level, moderately deep, somewhat poorly drained soil is on lacustrine terraces adjacent to flood plains. Areas range from 3 to 60 acres in size.

In a typical profile, the surface layer is brown silt loam about 7 inches thick. The subsoil is about 27 inches thick. The upper part is light brownish gray, mottled, firm silty clay loam, and the lower part is yellowish brown, mottled, very firm silty clay. The underlying material to a depth of 60 inches is light brownish gray, mottled silty clay that has thin strata of silty clay loam. In some areas the surface layer is thicker and darker. In other areas the solum has less clay. In places the slope is more than 2 percent.

Included with this soil in mapping are small areas of the well drained Markland soils near drainageways and on the higher terraces and the very poorly drained Zipp soils on the lower terraces. Also included are small areas of frequently flooded soils. Included soils make up 5 to 10 percent of the map unit.

The McGary soil is slowly permeable or very slowly permeable. The water table is at a depth of 1 to 3 feet during the winter and early spring. Available water capacity is moderate. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is difficult to work if it is tilled when too wet.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

If drained, this soil is fairly well suited to corn, soybeans, and small grain. Wetness is the main limitation. If suitable outlets are available, a subsurface drainage system can lower the water table. Cover crops and a conservation tillage system that leaves all or part of the crop residue on the surface increase the organic matter content and help to maintain good tilth.

If drained, this soil is well suited to grasses and some legumes, such as orchardgrass and ladino clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of wetness and frost action. A drainage system is necessary. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is fairly well suited to trees. The equipment limitation, seedling mortality, the windthrow hazard, and plant competition are concerns in managing the wooded areas. Equipment should be used only during dry periods or when the ground is frozen. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced. Water-tolerant species should be favored in timber stands. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying. Special planting stock and overstocking are needed. Some replanting is generally necessary.

Because of the wetness and the shrink-swell potential, this soil is severely limited as a site for dwellings. Subsurface drains help to lower the water table. Strengthening foundations, footings, and basement walls

and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling.

This soil is severely limited as a site for local roads and streets because of low strength and the shrink-swell potential. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and minimizes the damage caused by shrinking and swelling.

Because of the wetness and the very slow permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains are needed. Excavating the slowly permeable material and providing suitable fill material improve the ability of the field to absorb the effluent.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

Mo—Montgomery silty clay loam. This nearly level, deep, very poorly drained soil is on lacustrine terraces adjacent to bottom land and in depressions on uplands. It is subject to ponding by runoff from the higher adjacent slopes. Areas range from about 3 to 40 acres in size.

In a typical profile, the surface layer is very dark brown silty clay loam about 11 inches thick. The subsurface layer is black silty clay loam about 4 inches thick. The subsoil is very dark gray and dark gray, mottled, very firm silty clay about 22 inches thick. The underlying material to a depth of 60 inches is gray and yellowish brown, mottled silty clay loam and silty clay. In places the surface layer is more than 18 inches thick. In a few areas the solum is more than 42 inches thick. In some places the soil has as much as 15 inches of loamy overwash. In other places the underlying material has more clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Bromer soils and the poorly drained Peoga soils that have a clayey substratum. Both of the included soils are in the slightly higher areas. They make up 3 to 12 percent of the map unit.

The Montgomery soil is slowly permeable. The water table is near or above the surface during winter and early spring. Available water capacity is high. Runoff is very slow. The organic matter content is high in the surface layer. This layer becomes cloddy and is difficult to work if it is tilled when too wet.

Most areas of this soil are used for cultivated crops. A few are used for hay and pasture or are wooded.

If drained, this soil is fairly well suited to corn, soybeans, and small grain. Wetness is the main limitation. Surface drains and a subsurface drainage system reduce the hazard of ponding and the wetness. Establishing an adequate drainage system is difficult in areas where suitable outlets are not available. Cover crops and a conservation tillage system that leaves all or part of the crop residue on the surface increase the organic matter content and improve tilth. The soil is well suited to fall plowing.

If drained, this soil is well suited to grasses and some legumes, such as reed canarygrass and ladino clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of wetness and frost action. The ponding is a hazard. Surface drains and a subsurface drainage system reduce the hazard of ponding and the wetness. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. The equipment limitation, seedling mortality, the windthrow hazard, and plant competition are concerns in managing the wooded areas. Equipment should be used only during dry periods or when the ground is frozen. Water-tolerant species should be favored in timber stands. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying. Special planting stock and overstocking are needed. Some replanting is generally necessary. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

Because of the ponding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads and streets because of low strength, the ponding, and the shrink-swell potential. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Adequate side ditches and culverts are needed to remove excess water.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

No—Nolin silt loam, frequently flooded. This nearly level, deep, well drained soil is on flood plains. It is frequently flooded for long periods in winter and early spring. Areas range from 20 to 300 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is brown, friable silt loam about 42 inches thick. The underlying material to a depth of 60 inches is brown silt loam. In some places the surface layer is calcareous sandy loam. In other places the lower part of the subsoil is stratified with sand or sandy loam. In some areas the solum is less than 40 inches thick. In other areas the slope is more than 2 percent.

Included with this soil in mapping are small areas of poorly drained soils in drainageways and old sloughs. These soils make up 8 to 10 percent of the map unit.

The Nolin soil is moderately permeable. The water table is at a depth of 3 to 6 feet during the winter and

early spring. Available water capacity is high. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is difficult to work if it is tilled when too wet.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded.

This soil is well suited to corn, soybeans, and small grain. Wetness is the main limitation. The frequent flooding is a hazard. It generally occurs before the major crops are planted. If a good surface drainage system is installed, crops can be planted after floodwater recedes. Green manure crops and a conservation tillage system that leaves all or part of the crop residue on the surface increase the organic matter content and help to maintain tilth.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost action. The frequent flooding is a hazard. A few areas are protected by levees. Overgrazing causes surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, and timely grazing minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. The equipment limitation and plant competition are the main concerns in managing the wooded areas. Equipment should be used only during dry periods or when the ground is frozen. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads because of low strength and flooding. Strengthening or replacing the base with better suited material improves the ability of the roads to support vehicular traffic. Side ditches and culverts are needed to remove excess water.

The land capability classification is IIw. The woodland ordination symbol is 8W.

OtC2—Otwell silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, well drained soil is on lake plains. Areas range from 3 to 40 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 6 inches thick. It is mixed with a small amount of yellowish brown subsoil material. The subsoil is about 60 inches thick. It is yellowish brown. The upper part is friable silt loam and firm silty clay loam; the next part is a fragipan of mottled, firm silty clay loam and loam; and the lower part is mottled, firm, stratified silt loam and silty clay loam. The underlying material to a depth of 80 inches or more is yellowish brown, mottled, stratified silt loam and silty clay loam.

Included with this soil in mapping are small areas of the nearly level, somewhat poorly drained Dubois soils and the moderately well drained Haubstadt soils. Both of these soils are on the slightly lower parts of the landscape. Also included are small areas where gully erosion has occurred. Included soils make up about 10 percent of the map unit.

The Otwell soil is very slowly permeable. The water table is at a depth of 2.0 to 3.5 feet in late winter and in spring. Available water capacity is moderate. Runoff is rapid. The organic matter content is moderate in the surface layer.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

Because of the slope and the hazard of erosion, this soil is fairly well suited to corn, soybeans, and small grain. Cropping systems that include grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures help to prevent excessive soil loss. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to control erosion, maintain tilth, and increase the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the penetration of roots and the downward movement of water. Erosion is a hazard. Overgrazing or grazing when the soil is wet causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is fairly well suited to trees. Seedling mortality and the windthrow hazard are the main concerns in managing the wooded areas. Special planting stock and overstocking are needed. Some replanting is generally necessary. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

Because of the slope, the wetness, and the shrink-swell potential, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of the wetness. Houses should be built without basements. Subsurface drains help to lower the water table. Backfilling with coarse textured material helps to prevent the structural damage caused by shrinking and swelling.

This soil is severely limited as a site for local roads and streets because of the low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and minimizes the damage caused by frost action.

Because of the wetness and the very slow permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains help to lower the water table. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIIe. The woodland ordination symbol is 3D.

PeA—Pekin silt loam, 0 to 2 percent slopes. This nearly level, deep, moderately well drained soil is on alluvial terraces. Areas range from 3 to 70 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 38 inches thick. The upper part is yellowish brown, friable silt loam, and the lower part is a fragipan of yellowish brown, mottled, firm, brittle silty clay loam and silt loam. The underlying material to a depth of 60 inches is light yellowish brown, mottled silty clay loam. In some places the depth to the fragipan is less than 24 inches. In other places the solum is more than 60 inches thick. In some areas the slope is more than 2 percent. In other areas limestone or sandstone bedrock is below a depth of 60 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Bartle and poorly drained Peoga soils on the slightly lower parts of the landscape. Also included are the somewhat poorly drained Stendal soils in the lower drainageways. Included soils make up 10 to 15 percent of the map unit.

The Pekin soil is moderately permeable above the fragipan and very slowly permeable in the fragipan. The water table is at a depth of 2 to 6 feet during the winter and early spring. Available water capacity is moderate. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

This soil is well suited to corn, soybeans, and small grain. Drought is the main hazard. It can damage crops in years when rainfall is below average or is poorly distributed. A conservation tillage system that leaves protective amounts of crop residue on the surface minimizes crusting and increases the rate of water infiltration. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to maintain tilth and increase the organic matter content. A subsurface drainage system is needed in some drainageways and swales.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the penetration of roots and the downward movement of water. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction, increase the rate of water infiltration, and help to maintain good tilth and plant density.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because of the wetness, this soil is moderately limited as a site for dwellings without basements and severely limited as a site for dwellings with basements. Building on raised, well compacted fill material helps to overcome the wetness. Because of low strength and frost action, the soil is severely limited as a site for local roads and streets. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and minimizes the damage caused by frost action. This soil is severely limited as a site for septic tank absorption fields because of the wetness and the very slow permeability. Perimeter drains help to lower the water table. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIs. The woodland ordination symbol is 4A.

PeB—Pekin silt loam, 2 to 6 percent slopes. This gently sloping, deep, moderately well drained soil is on alluvial terraces. Areas range from 3 to 100 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is about 35 inches thick. The upper part is light yellowish brown, friable silt loam; the next part is yellowish brown, mottled, firm silty clay loam; and the lower part is a fragipan of yellowish brown, mottled, firm, brittle silty clay loam and silt loam. The underlying material to a depth of 60 inches is yellowish brown, mottled silt loam. In places the depth to the fragipan is less than 24 inches. In some areas limestone or sandstone bedrock is below a depth of 60 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Bartle and poorly drained Peoga soils on the slightly lower parts of the landscape. Also included are the somewhat poorly drained Stendal soils in the lower drainageways and small areas of severely eroded soils. Included soils make up 10 to 15 percent of the map unit.

The Pekin soil is moderately permeable above the fragipan and very slowly permeable in the fragipan. The water table is at a depth of 2 to 6 feet during the winter and early spring. Available water capacity is moderate. Runoff is medium. The organic matter content is moderate in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

This soil is well suited to corn, soybeans, and small grain. The hazards of erosion and drought are the main management concerns. They can be reduced by cropping systems that include grasses and legumes, a conservation tillage system that leaves protective amounts of the crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content. Subsurface drainage systems are needed in some of the drainageways and swales.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the penetration of roots and the downward movement of water. Overgrazing or grazing when the soil is wet causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because of the wetness, this soil is moderately limited as a site for dwellings without basements and severely limited as a site for dwellings with basements. Building on raised, well compacted fill material helps to overcome the wetness. Because of low strength and frost action, the soil is severely limited as a site for local roads and streets. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and minimizes the damage caused by frost action. Because of the wetness and the very slow permeability, the soil is severely limited as a site for septic tank absorption fields. Perimeter drains lower the water table. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIe. The woodland ordination symbol is 4A.

PeC2—Pekin silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, moderately well drained soil is on side slopes adjacent to drainageways on alluvial terraces. Areas range from 3 to 25 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 5 inches thick. It is mixed with a small amount of yellowish brown subsoil material. The subsoil is yellowish brown silt loam about 37 inches thick. The upper part is friable, the next part is mottled and friable, and the lower part is a mottled, firm fragipan. The underlying material to a depth of 60 inches is yellowish brown, mottled silt loam. In places the depth to the fragipan is less than 24 inches. In some areas limestone or sandstone bedrock is below a depth of 60 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Bartle and poorly drained Peoga soils on the slightly lower parts of the landscape. Also included are the somewhat poorly drained Stendal soils in the lower drainageways. Included soils make up 10 to 15 percent of the map unit.

The Pekin soil is moderately permeable above the fragipan and very slow in the fragipan. The water table is at a depth of 2 to 6 feet during the winter and early spring. Available water capacity is moderate. Runoff is rapid. The organic matter content is moderate in the surface layer.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

Because of the slope and the hazard of erosion, this soil is only fairly well suited to corn, soybeans, and small grain. Cropping systems that are dominated by grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures help to prevent excessive soil loss. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to control erosion, improve or maintain tilth, and increase the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the penetration of roots and the downward movement of water. Overgrazing or grazing when the soil is wet causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

Because of the wetness and the slope, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of the wetness. Building on raised, well compacted fill material helps to overcome the wetness. The buildings should be designed so that they conform to the natural slope of the land.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and minimizes the damage caused by frost action.

Because of the wetness and the very slow permeability, this soil is severely limited as a site for

septic tank absorption fields. Perimeter drains help to lower the water table. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

Pg—Peoga silt loam. This nearly level, deep, poorly drained soil is on low terraces. Areas range from about 4 to 40 acres in size.

In a typical profile, the surface layer is grayish brown silt loam about 8 inches thick. The subsoil is about 47 inches thick. It is gray and mottled. The upper part is friable silt loam, and the lower part is firm silty clay loam. The underlying material to a depth of 60 inches is gray, mottled silt loam.

Included with this soil in mapping are small areas of the moderately well drained Bedford and somewhat poorly drained Bartle soils on the higher parts of the landscape. These soils make up 10 to 15 percent of the map unit.

The Peoga soil is slowly permeable. The water table is at or near the surface during winter and early spring. Available water capacity is high. Runoff is slow or very slow. The organic matter content is moderate in the surface layer. This layer is difficult to work if it is tilled when too wet.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded.

If drained, this soil is fairly well suited to corn, soybeans, and small grain. Wetness is the main limitation. A subsurface drainage system can lower the water table. Green manure crops and a conservation tillage system that leaves all or part of the crop residue on the surface increase the organic matter content and improve tilth.

If drained, this soil is well suited to grasses and some legumes, such as reed canarygrass and ladino clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of wetness and frost action. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. The equipment limitation, seedling mortality, the windthrow hazard, and plant competition are concerns in managing the wooded areas. Equipment should be used only during dry periods or when the ground is frozen. Water-tolerant species should be favored in timber stands. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying. Special planting stock and overstocking are needed. Some replanting is generally necessary. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

Because of the wetness, this soil is severely limited as a site for dwellings. Subsurface drains help to lower the water table. Building on raised, well compacted fill material also helps to overcome the wetness. The soil is severely limited as a site for local roads and streets because of low strength, wetness, and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Compacted fill material and adequate side ditches and culverts help to prevent the damage caused by wetness and frost action. Because of the wetness and the slow permeability, the soil is severely limited as a site for septic tank absorption fields. Providing suitable fill material improves the ability of the field to absorb the effluent and helps to overcome the wetness.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

Ph—Peoga silt loam, clayey substratum. This nearly level, deep, poorly drained soil is in upland depressions. Areas range from about 3 to 150 acres in size.

In a typical profile, the surface layer is dark gray silt loam about 8 inches thick. The subsurface layer is gray, mottled silt loam about 5 inches thick. The subsoil is about 67 inches thick. The upper part is gray, mottled, firm silty clay loam; the next part is dark gray, mottled, firm silty clay loam; and the lower part is gray, mottled, very firm and firm silty clay and silty clay loam.

Included with this soil in mapping are small areas of the moderately well drained Bedford and somewhat poorly drained Bromer soils on the higher parts of the landscape. These soils make up 5 to 10 percent of the map unit.

The Peoga soil is slowly permeable. The water table is at or near surface during winter and early spring. Available water capacity is high. Runoff is slow or very slow. The organic matter content is moderate in the surface layer. This layer is difficult to work if it is tilled when too wet.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded.

If drained, this soil is fairly well suited to corn, soybeans, and small grain. Wetness is the main limitation. If adequate outlets are available, a subsurface drainage system can lower the water table. Green manure crops and a conservation tillage system that leaves all or part of the crop residue on the surface increase the organic matter content and improve tilth.

This soil is well suited to grasses and some legumes, such as reed canarygrass and ladino clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost action. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during

wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. The equipment limitation, seedling mortality, the windthrow hazard, and plant competition are concerns in managing the wooded areas. Equipment should be used only during dry periods or when the ground is frozen. Water-tolerant species should be favored in timber stands. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying. Special planting stock and overstocking are needed. Some replanting is generally necessary. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

Because of the wetness, this soil is severely limited as a site for dwellings. Subsurface drains help to lower the water table. Building on raised, well compacted fill material helps to overcome the wetness. The soil is severely limited as a site for local roads and streets because of low strength, wetness, and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Compacted fill material and adequate side ditches and culverts help to prevent the damage caused by wetness and frost action. Because of the wetness and the slow permeability, the soil is severely limited as a site for septic tank absorption fields. Providing suitable fill material improves the ability of the field to absorb the effluent and helps to overcome the wetness.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

Pt—Pits, quarries. This map unit consists of open excavations from which soil and the underlying limestone have been removed (fig. 13). Limestone bedrock has been exposed. The unit supports few or no plants. Areas range from 3 to 50 acres in size.

Included with the pits in mapping are small areas of water. Also included is an abandoned sandpit in the southeast corner of the county. Included areas make up about 10 to 15 percent of the map unit.

This unit is severely limited as a site for all farm and nonfarm uses. If properly managed, abandoned pits could be used as recreational areas or as wildlife habitat.

No land capability classification or woodland ordination symbol is assigned.

RsB—Rossmoyne silt loam, 2 to 6 percent slopes. This gently sloping, deep, moderately well drained soil is on side slopes in the uplands. Areas range from 3 to 50 acres in size.

In a typical profile, the surface layer is brown silt loam about 8 inches thick. The subsoil is about 62 inches thick. In sequence downward, it is yellowish brown, friable silt loam; yellowish brown, mottled, firm silt loam; a fragipan of yellowish brown and strong brown, mottled, firm, brittle silty clay loam and clay loam; and strong brown, mottled, firm clay loam. The underlying material to a depth of 80 inches is yellowish brown, mottled clay loam. In some small areas the soil is on lake plains or terraces.

Included with this soil in mapping are small areas of the nearly level, somewhat poorly drained Avonburg soils on the higher parts of the landscape and the well drained Cincinnati and Hickory soils on the lower, steeper parts. Included soils make up about 10 percent of the map unit.

The Rossmoyne soil is moderately slowly permeable or slowly permeable. The water table is at a depth of 1.5 to 3.0 feet during the winter and early spring. Available water capacity is moderate. Runoff is medium. The organic matter content is moderate in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

This soil is well suited to corn, soybeans, and small grain. Erosion is the main management concern. Cropping systems that include grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures help to prevent excessive soil loss. Cover crops help to control erosion, improve tilth, and maintain the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the penetration of roots and the downward movement of water. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

This soil is fairly well suited to trees. Seedling mortality, the windthrow hazard, and plant competition are the main concerns in managing the wooded areas. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying. Special planting stock and overstocking are needed. Some replanting is generally necessary. Carefully thinning the stands or not thinning them at all helps to prevent windthrow.

Because of the wetness and the shrink-swell potential, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of the wetness. Building on raised, well compacted fill material helps to overcome the wetness. Also, the houses should be built without basements. Strengthening foundations, footings, and basement walls and backfilling with coarse textured

Figure 13.—Exposed limestone in an abandoned area of Pits, quarries.

material help to prevent the structural damage caused by shrinking and swelling.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and minimizes the damage caused by frost action.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains help to lower the water table. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIe. The woodland ordination symbol is 3D.

Sf—Stendal silt loam, frequently flooded. This nearly level, deep, somewhat poorly drained, acid soil is on flood plains along the major streams, in narrow drainageways, in narrow draws, and on toe slopes. It is frequently flooded for long periods in winter and early spring. Areas range from 5 to 100 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 10 inches thick. The underlying material to a depth of 60 inches is grayish brown and gray, mottled silt loam. In places the soil is less acid.

Included with this soil in mapping are small areas of the somewhat poorly drained Bartle soils. These soils have a fragipan. They are on the higher terraces. Also included are the well drained Cuba soils in the slightly higher areas and the very poorly drained Zipp soils in the lower drainageways. Included soils make up 10 to 15 percent of the map unit.

The Stendal soil is moderately permeable. The water table is at a depth of 1 to 3 feet during the winter and early spring. Available water capacity is very high. Runoff is very slow. The organic matter content is moderate in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

If drained, this soil is well suited to corn, soybeans, and small grain. Wetness is the main limitation. The flooding is a hazard. It generally occurs before the major crops are planted. If adequate outlets are available, a subsurface drainage system can lower the water table. A conservation tillage system that leaves protective amounts of crop residue on the surface, cover crops, and green manure crops improve tilth and help to maintain the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and ladino clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost action. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. The equipment limitation and plant competition are the main concerns in managing the wooded areas. Equipment should be used only during dry periods or when the ground is frozen. Water-tolerant species should be favored in timber stands. Seedlings survive and grown well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads because of the flooding and frost action. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by floodwater and frost action.

The land capability classification is IIw. The woodland ordination symbol is 5W.

So—Stendal silt loam, occasionally flooded. This nearly level, deep, somewhat poorly drained soil is on flood plains along the major streams, in narrow drainageways, in narrow draws, and on toe slopes. It is occasionally flooded for brief periods in the spring. Watershed dam structures provide some protection against flooding. Areas range from 5 to 50 acres in size.

In a typical profile, the surface layer is brown silt loam about 9 inches thick. The underlying material to a depth of 60 inches is light brownish gray and brown, mottled silt loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Bartle soils. These soils have a fragipan. They are on the higher terraces. Also included are the well drained Cuba soils in the slightly higher areas, the very poorly drained Zipp soils in the lower drainageways, and small areas where the soil is frequently flooded. Included soils make up 10 to 15 percent of the map unit.

The Stendal soil is moderately permeable. The water table is at a depth of 1 to 3 feet during the winter and early spring. Available water capacity is very high. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for hay or pasture. Some are wooded. A few are used for specialty crops, such as tobacco.

If drained, this soil is well suited to corn, soybeans, and small grain. Wetness is the main limitation. The flooding is a hazard. It generally occurs before the major crops are planted. Surface drains and a subsurface drainage system help to overcome the hazard of flooding and the wetness. Establishing an adequate drainage system is difficult in areas where suitable outlets are not available.

If drained, this soil is well suited to grasses and some legumes, such as orchardgrass and ladino clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of wetness and frost action. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. The equipment limitation and plant competition are the main concerns in managing the wooded areas. Equipment should be used only during dry periods or when the ground is frozen. Water-tolerant species should be favored in timber

stands. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads because of the flooding and frost action. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by floodwater and frost action.

The land capability classification is IIw. The woodland ordination symbol is 5W.

Wa—Wakeland silt loam, frequently flooded. This nearly level, deep, somewhat poorly drained soil is on flood plains along the major streams, in narrow drainageways, in narrow draws, on toe slopes, and at the bottom of sinkholes. It is frequently flooded for brief periods in winter and early spring. Water stands on the bottom of sinkholes for short periods in winter and spring. Areas range from 3 to 60 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 10 inches thick. The underlying material to a depth of 60 inches is mottled silt loam. It is brown in the upper part, gray and grayish brown in the next part, and brown in the lower part. In places the soil is only occasionally flooded.

Included with this soil in mapping are small areas of the moderately well drained Bedford and well drained Crider soils. These soils formed in loess and in the underlying residuum. They are in the higher areas. Also included are areas of the well drained Haymond soils on the slightly higher parts of the landscape and small areas of poorly drained soils in depressions. Included soils make up about 12 percent of the unit.

The Wakeland soil is moderately permeable. The water table is at a depth of 1 to 3 feet during winter and early spring. Available water capacity is very high. Runoff is very slow. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

If drained, this soil is well suited to corn, soybeans, and small grain. Wetness is the main limitation. The flooding is a hazard. It generally occurs before the major crops are planted. If suitable outlets are available, a subsurface drainage system can lower the water table. A conservation tillage system that leaves protective amounts of crop residue on the surface, cover crops, and green manure crops improve tilth and help to maintain the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and ladino clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of wetness and frost action. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads because of the flooding and frost action. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by floodwater and frost action.

The land capability classification is IIw. The woodland ordination symbol is 5A.

WeC2—Wellston silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, well drained soil is on uplands. Areas range from 3 to 90 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 6 inches thick. It is mixed with a small amount of strong brown subsoil material. The subsoil is about 32 inches thick. The upper part is strong brown and yellowish brown, firm silty clay loam, and the lower part is light yellowish brown, friable loam. The underlying material is brown channery loam about 12 inches thick. Hard sandstone bedrock is at a depth of about 50 inches. In some places the soil formed in outwash material. In other places the solum is less than 30 inches thick. In some areas the subsoil has more sand. In other areas the depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of the moderately deep Berks and shallow Weikert soils on the lower, steeper side slopes. These soils make up about 12 percent of the map unit.

The Wellston soil is moderately permeable. Available water capacity also is moderate. Runoff is rapid. The organic matter content is moderate in the surface layer.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

Because of the slope and the hazard of erosion, this soil is only fairly well suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are cropping systems that include grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to control erosion, improve tilth, and help to maintain the organic matter content.

This soil is well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay or pasture. Overgrazing causes surface compaction and excessive runoff. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the slope, this soil is moderately limited as a site for dwellings without basements. It is moderately limited as a site for dwellings with basements because of the depth to bedrock and the slope. Overcoming the depth to bedrock is quite expensive. As a result, houses without basements should be considered. The buildings should be designed so that they conform to the natural slope of the land.

This soil is severely limited as a site for local roads and streets because of frost action. Replacing or covering the upper soil layers with suitable base material helps to prevent the damage caused by frost action.

Because of the depth to bedrock, the moderate permeability, and the slope, this soil is moderately limited as a site for septic tank absorption fields. Installing the absorption field on the contour, increasing the size of the absorption field, and filling or mounding the site with suitable material can minimize these limitations.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

WeD—Wellston silt loam, 12 to 18 percent slopes. This strongly sloping, deep, well drained soil is on side slopes adjacent to drainageways in the uplands. Areas range from 3 to 60 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 6 inches thick. The subsoil is about 31 inches thick. It is yellowish brown and friable. The upper part is silt loam and silty clay loam, and the lower part is channery silt loam. The underlying material is yellowish brown channery silt loam about 15 inches thick. Yellowish brown, hard sandstone bedrock is at a depth of about 52 inches. In places the soil formed in outwash deposits. In some areas the subsoil is thinner and has more sand.

Included with this soil in mapping are small areas of the moderately deep Berks and shallow Weikert soils on the lower, steeper side slopes. Also included are small areas of severely eroded soils. Included soils make up about 12 percent of the map unit.

The Wellston soil is moderately permeable. Available water capacity also is moderate. Runoff is rapid. The organic matter content is moderate in the surface layer.

Most areas of this soil are used for hay and pasture. Some are wooded. A few are used for cultivated crops.

Because of the slope and the hazard of erosion, this soil is poorly suited to corn, soybeans, and small grain. Erosion is the main management concern. It can be controlled by cropping systems that are dominated by grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures. The soil is well suited to no-till planting. Cover crops help to control erosion, improve tilth, and maintain the organic matter content.

This soil is fairly well suited to grasses and legumes, such as orchardgrass, red clover, and alfalfa, for hay and is well suited to pasture. Overgrazing causes surface compaction and excessive runoff and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

This soil is fairly well suited to trees. The erosion hazard, the equipment limitation, and plant competition are the main concerns in managing the wooded areas. Locating logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. During wet periods, roads tend to be slippery and ruts form easily. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the slope, this soil is severely limited as a site for dwellings and septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Absorption fields should be installed on the contour. The soil is severely limited as a site for local roads and streets because of the slope and frost action. Constructing the roads on the contour and land shaping help to overcome the slope. Replacing or covering the upper soil layers with suitable base material helps to prevent the damage caused by frost action.

The land capability classification is IVe. The woodland ordination symbol is 4R.

ZaB—Zanesville silt loam, 1 to 6 percent slopes. This gently sloping, deep, moderately well drained or well drained soil is on uplands. Areas range from 3 to 100 acres in size.

In a typical profile, the surface layer is dark yellowish brown silt loam about 7 inches thick. The subsoil is about 49 inches thick. In sequence downward, it is dark yellowish brown, firm silt loam; strong brown, mottled, firm silty clay loam; a fragipan of yellowish brown, mottled, firm, brittle silty clay loam and clay loam; and yellowish brown, mottled, firm silty clay loam. Strong brown, hard sandstone bedrock is at a depth of about 56 inches. In places the fragipan is at a depth of 15 to 20 inches. In most undisturbed areas the surface layer is darker.

Included with this soil in mapping are small areas of the well drained, moderately deep Berks and Gilpin soils on the lower, steeper side slopes. Also included are small areas of severely eroded soils. Included soils make up 10 to 15 percent of the map unit.

The Zanesville soil is moderately permeable above the fragipan and moderately slowly permeable or slowly permeable in and below the fragipan. The water table is at a depth of 2 to 3 feet during the winter and early spring. Available water capacity is moderate. Runoff is medium. The organic matter content is moderately low in the surface layer. This layer is friable and can be tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded or are used for specialty crops, such as tobacco.

This soil is well suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are a conservation tillage system that leaves protective amounts of crop residue on the surface and a crop rotation that includes grasses and legumes. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to control erosion, improve tilth, and maintain the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the penetration of roots and the downward movement of water. Overgrazing causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates and pasture rotation minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the wetness, this soil is moderately limited as a site for dwellings without basements and severely limited as a site for dwellings with basements. Subsurface drains help to lower the water table. The dwellings should be constructed without basements. The soil is severely limited as a site for local roads and streets because of low strength. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic. Because of the wetness and the restricted permeability, the soil is severely limited as a site for septic tank absorption fields. Perimeter drains help to lower the water table. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIe. The woodland ordination symbol is 7A.

ZaC2—Zanesville silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, moderately well drained or well drained soil is on side slopes adjacent to drainageways in the uplands. Areas range from 3 to 50 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 5 inches thick. It is mixed with a small amount of yellowish brown subsoil material. The subsoil is about 47 inches thick. The upper part is yellowish brown, firm silty clay loam; the next part is a fragipan of yellowish brown, mottled, firm, brittle silt loam; and the lower part is light yellowish brown, mottled, firm silty clay loam. The underlying material is brownish yellow, mottled silt loam about 18 inches thick. Yellowish brown sandstone bedrock is at a depth of about 70 inches. In some places the fragipan is at a depth of 15 to 20 inches. In other places the soil formed in loess and in limestone residuum. In some areas the slope is more than 12 percent. In some undisturbed areas the surface layer is darker.

Included with this soil in mapping are small areas of the well drained, moderately deep Berks and Gilpin soils on the lower, steeper side slopes. These soils make up 10 to 15 percent of the map unit.

The Zanesville soil is moderately permeable above the fragipan and moderately slowly permeable or slowly permeable in and below the fragipan. The water table is at a depth of 2 to 3 feet during the winter and early spring. Available water capacity is moderate. Runoff is rapid. The organic matter content is moderately low in the surface layer.

Most areas of this soil are used for hay and pasture. Some are wooded. A few are used for specialty crops, such as tobacco.

Because of the hazard of erosion, this soil is only fairly well suited to corn, soybeans, and small grain. Cropping systems that include grasses and legumes, a conservation tillage system that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures help to control erosion. The soil is well suited to no-till and till-plant cropping systems. Cover crops help to control erosion, improve tilth, and maintain the organic matter content.

This soil is well suited to grasses and some legumes, such as orchardgrass and red clover, for hay or pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the penetration of roots and the downward movement of water. Overgrazing causes surface compaction, excessive runoff, and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, timely grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. Plant competition is moderate. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the slope and the wetness, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of the wetness. The buildings should be designed so that they conform to the natural slope of the land. Subsurface drains help to lower the

water table. The dwellings generally should be constructed without basements.

This soil is severely limited as a site for local roads and streets because of low strength. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic.

Because of the wetness and the restricted permeability, this soil is severely limited as a site for septic tank absorption fields. Perimeter drains help to lower the water table. Providing suitable fill material improves the ability of the field to absorb the effluent.

The land capability classification is IIIe. The woodland ordination symbol is 7A.

Zp—Zipp silty clay. This nearly level, deep, very poorly drained soil is on broad, plane or very slightly concave lacustrine terraces. It is subject to ponding. Areas range from 30 to 1,500 acres in size.

In a typical profile, the surface layer is dark grayish brown silty clay about 8 inches thick. The subsoil is gray, mottled, very firm silty clay about 34 inches thick. The underlying material to a depth of 60 inches is gray, mottled silty clay. In places the surface layer is silty clay loam.

Included with this soil in mapping are small areas of the well drained Markland and somewhat poorly drained McGary and Stendal soils on the higher parts of the landscape. These soils make up 5 to 8 percent of the map unit.

The Zipp soil is slowly permeable. The water table is near or above the surface during the winter and early spring. Available water capacity is moderate. Runoff is very slow. The organic matter content is moderate in the surface layer. This layer becomes cloddy and is difficult to work if it is tilled when too wet.

Most areas of this soil are used for cultivated crops. A few are used for hay, pasture, or woodland.

If drained, this soil is fairly well suited to corn, soybeans, and small grain. Wetness is the main limitation. Surface drains and a subsurface drainage system help to overcome the hazard of the ponding and the wetness. Establishing an adequate drainage system is difficult in areas where suitable outlets are not available. Land leveling and land shaping help to control surface water. A bedding system, in which crops are planted on prepared ridges, helps to keep the plants above the water table. Cover crops and a conservation tillage system that leaves all or part of the crop residue on the surface increase the organic matter content and help to maintain good tilth. The soil is well suited to fall plowing and to fall chiseling.

This soil is well suited to grasses and some legumes, such as reed canarygrass and ladino clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of wetness and frost action. Ponding is a hazard. Surface drains and a subsurface drainage system help to overcome the hazard of ponding and the wetness. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth and reduces plant density and plant hardiness. Proper stocking rates, pasture rotation, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is well suited to trees. The equipment limitation, seedling mortality, the windthrow hazard, and plant competition are concerns in managing the wooded areas. Equipment should be used only during dry periods or when the ground is frozen. Water-tolerant species should be favored in timber stands. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying. Special planting stock and overstocking are needed. Some replanting is generally necessary. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

Because of the ponding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads because of low strength, ponding, and the shrink-swell potential. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding and by shrinking and swelling and improve the ability of the roads to support vehicular traffic.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban and built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The

temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 98,321 acres in the survey area, or nearly 30 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are in map units 1, 2, 3, 6, 7, 8, 9, and 10, which are described under the heading "General Soil Map Units." Approximately 80,000 acres of the prime farmland is used for crops. The crops grown on this land, mainly corn, soybeans, and small grain, account for an estimated two-thirds of the county's total agricultural income each year.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify for prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Lawrence Wilson and Mike Warner, district conservationists, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information and technical assistance can be obtained from the local office of the Soil Conservation Service, the Cooperative Extension Service, or the Washington County Soil and Water Conservation District.

About 138,715 acres in the county was used for crops and pasture in 1982. Of this total, 76,671 acres was used for row crops, mainly corn and soybeans; 10,400 acres for small grain, mainly wheat and oats; 46,071 acres for hay and pasture; and 5,573 acres was idle or was used for other purposes. The acreage used for crops has been increasing in the last few years. Some land is being converted to housing developments, but most of this land formerly was wooded or pasture.

The potential of the soils in Washington County for increased food production is good. About 37,869 acres of potentially good cropland is currently used as woodland and about 29,209 acres as pasture. In addition to the reserve productive capacity represented by this land, food production could also be increased considerably by extending the latest crop production technology to all of the cropland in the county. This soil survey can facilitate the application of such technology.

The paragraphs that follow describe the major management concerns in the areas of the county used for crops and pasture. These concerns are erosion, flooding, wetness, root-limiting layers, and low pH.

Erosion is the major problem on about 78 percent of the cropland and pasture in the county. It is a hazard if the slope is more than 2 percent. Alvin, Baxter Variant, Bedford, Bloomfield, Caneyville, Cincinnati, Crider, Hagerstown, Haubstadt, Frederick, Markland, Otwell, Rossmoyne, Wellston, and Zanesville soils generally have a slope of more than 2 percent.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the original surface layer is lost and part of the subsoil is mixed with the plow layer. Loss of the surface layer is especially damaging on soils that have a high content of clay in the subsoil, such as Baxter Variant, Caneyville, Crider, Frederick, Hagerstown, and Wellston soils, and on soils that have a fragipan, such as Bedford,

Cincinnati, Haubstadt, Otwell, Rossmoyne, and Zanesville soils. Second, erosion can result in sedimentation of streams. Control of erosion minimizes this pollution and improves water quality for municipal use, for recreation, and for fish and wildlife.

In severely eroded spots in many sloping fields, preparing a good seedbed and tilling are difficult because the original friable surface soil has been eroded away and the subsoil is being tilled. Such spots are common in areas of Baxter Variant, Caneyville, Crider, Frederick, and Hagerstown soils.

Erosion-control practices provide a protective cover, reduce the runoff rate, and increase the rate of water infiltration. A cropping system that keeps a vegetative cover on the soil for extended periods can hold soil losses to an amount that does not reduce the productive capacity of the soils. On livestock farms, where pasture and hay are needed, including forage crops of grasses and legumes in the cropping sequence reduces the susceptibility of the more sloping areas to erosion and provides nitrogen and improves tilth for the following crop. Orchardgrass, fescue, redtop, bluegrass, alfalfa, and red clover grow well on well drained soils. Reed canarygrass grows best on poorly drained or very poorly drained soils. Ladino clover grows well on the wetter soils.

Diversions and parallel terraces shorten the length of the slopes and thus are effective in reducing the susceptibility to sheet, rill, and gully erosion. These measures are most practical on deep, well drained soils that are highly susceptible to erosion. Examples are Crider and Hagerstown soils. Terraces reduce soil loss and the associated loss of fertilizer elements, help to prevent the damage to crops and watercourses caused by eroding sediment, and help to eliminate the need for grassed waterways, which take productive land out of row crop production. Terracing also makes farming on the contour easier and thus reduces the consumption of fuel and the amount of pesticides entering watercourses. Berks, Gilpin, Weikert, Caneyville, and other soils that have bedrock within a depth of 40 inches and Crider, Hagerstown, Frederick, and other soils that have a clayey subsoil are less well suited to terraces and diversions than other soils. Conservation tillage is very effective on these well drained soils.

A system of conservation tillage helps to control erosion by leaving a protective amount of crop residue on the surface. It reduces soil loss by 50 to 90 percent on sloping land. Common examples of conservation tillage in Washington County are no-tillage, strip tillage, and mulch tillage. Conservation tillage not only helps to control erosion but also improves soil structure, helps to prevent excessive compaction and the formation of tillage pans, improves soil aeration and tilth, increases the rate of water infiltration, reduces fuel consumption to one-sixteenth of that required for ordinary tillage, and reduces the wear on machinery and the amount of labor and time needed to plant a crop. The tillage systems should be suited to the soil.

Other erosion-control measures are grassed waterways, chisel plowing, contour farming, and a crop rotation that includes grasses and legumes. A permanent cover of hay or pasture plants helps to control erosion on slopes of more than 12 percent.

Flooding is a problem on approximately 11 percent of the cropland and pasture in the county. Bonnie, Cuba, Haymond, Nolin, Stendal, and Wakeland soils are frequently flooded. Major flooding problems cannot be solved by an individual landowner. Community action is needed. Three Public Law 566 watershed projects have been implemented in the Elk Creek, Delaney Creek, and Twin Rush watersheds. These projects have greatly reduced the flooding hazard in those areas. Open ditches, diversions, and surface drains can reduce the extent of the crop damage resulting from minor flooding.

Wetness is the major problem on about 13 percent of the cropland and pasture in the county. A surface and subsurface drainage system is needed on Bartle, Bonnie, Bromer, Dubois, McGary, Montgomery, Peoga, Stendal, Wakeland, and Zipp soils. About half of the acreage of these soils is adequately drained. A few areas of Bromer, Montgomery, Peoga, and Zipp soils, however, cannot be economically drained. These are depressional areas where drainage ditches would have to be deep and would have to extend for a great distance to a suitable outlet. Unless drained, the somewhat poorly drained Avonburg, Bartle, Bromer, Dubois, McGary, Stendal, and Wakeland soils are so wet that crops are damaged in most years.

The design of both surface and subsurface drainage systems varies with the kind of soil. A combination of surface and subsurface drains is needed in most areas of the very poorly drained soils that are intensively row cropped. The drains should be more closely spaced in slowly permeable soils than in the more rapidly permeable soils. Locating adequate drainage outlets is difficult in many areas of Bonnie, Montgomery, Peoga, and Zipp soils. Information about the design of drainage systems for each kind of soil is given in the Technical Guide, which is available in local offices of the Soil Conservation Service.

A root-limiting layer is a problem in some soils. An example is the fragipan in the Bartle, Bedford, Cincinnati, Dubois, Haubstadt, Otwell, Pekin, Rossmoyne, and Zanesville soils. The fragipan limits root growth. Crop and pasture yields are reduced during periods of limited rainfall because almost all of the water available to plants is in the soil layers above the fragipan.

The fragipan in many soils results in a perched water table during wet periods, usually during winter and spring. Frost heaving is a severe hazard on these soils. Alfalfa and other plants that have a taproot are often pushed out of the ground during freezing and thawing cycles.

Low pH is a management problem in the county. Nearly all of the soils are naturally acid. Bonnie, Burnside, Cuba, Stendal, and other soils on flood plains range from very strongly acid to neutral.

Most of the soils on uplands are naturally acid, especially those that formed in material weathered from sandstone, siltstone, and shale. Applications of ground limestone are needed to raise the pH level sufficiently for good production of alfalfa, red clover, soybeans, and other crops that grow well only on nearly neutral soils. Available phosphorus and potash levels are naturally low in most of these soils. On all soils additions of lime and fertilizer should be based on the results of soil tests, the needs of the crop, and the expected level of yields.

Field crops suited to the soils and climate of the county include several that are not commonly grown. Corn and soybeans are the main row crops. Wheat and oats are the chief close-grown crops. Rye and barley are grown to a lesser extent, and grass seed is produced from fescue, orchardgrass, redtop, and bluegrass.

Tobacco is of commercial importance in the county. Approximately 179 farms in the county produced more than 453,637 pounds of tobacco in 1978.

Specialty crops also are of commercial importance in the county. Only a small acreage is used for vegetables and fruits. In 1978, the county had 15 orchards. Deep, well drained soils that warm up early in spring are especially well suited to many vegetables and small fruits. Crops can generally be planted and harvested earlier on all these soils than on the other soils in the county.

Most of the well drained soils in the county, such as Crider soils, are suitable for orchards and nursery crops. Soils in low positions on the landscape where frost is frequent and air drainage is poor generally are poorly suited to early vegetables, small fruits, and orchards.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Mitchell G. Hassler, forester, Soil Conservation Service, helped prepare this section.

Virgin forest once covered all of Washington County, but the trees have been cleared on most of the land suitable for cultivation. Woodland currently makes up approximately 130,000 acres, or 39 percent of the county. About 7.5 percent of this acreage, mostly in the northern and eastern parts of the county, is owned by the Indiana Department of Natural Resources. The rest is privately owned. The largest areas of woodland are in the Berks-Weikert-Wellston and Gilpin-Berks map units, which are described under the heading "General Soil Map Units." Much of the woodland is in areas of soils that are too steep, too wet, or too inaccessible for farming. These soils can produce trees of high quality if the woodland is properly managed.

The most common trees in the uplands are mixed hardwoods, mainly hickory, white oak, black oak, northern red oak, and yellow-poplar. Shortleaf pine, Virginia pine, and white pine have been planted during the past 45 years on uplands that previously were cleared but were too steep for farming. The main species on bottom land are cottonwood, sycamore, hickory, sweetgum, and pin oak.

Much of the commercial woodland can be improved by the removal of mature trees, undesirable species, and vines, by measures that protect the woodland from grazing and fire, and by control of disease and insects. The Soil Conservation Service, the Indiana Department of Natural Resources, Division of Forestry, and the Cooperative Extension Service can help in determining specific management needs.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, a high content of rock fragments in the soil. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely

restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced on a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 9 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 9 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

Washington County has many areas of scenic, geologic, and historic interest. These areas are used for camping, hiking, hunting, fishing, sightseeing, picnicking, and boating. Public areas available for recreation include Elk Creek Lake, Lake John Hay, the Delaney Creek watershed, Lake Salinda, and Henderson Park. Beck's Mill and the John Hay Museum are of historic interest. The Indiana Department of Natural Resources has constructed a boat-launching ramp at the junction of the Muscatatuck and White Rivers.

The use of the recreational areas in the county has increased greatly in recent years. Many soils are well suited to the development of recreational facilities. Some of the better suited soils are in the Berks-Weikert-Wellston and Gilpin-Berks map units, which are described under the heading "General Soil Map Units." These units are characterized by hilly terrain, wooded slopes, exposed rock formations, and many streams, all of which provide a variety of possibilities for recreation.

The soils of the survey area are rated in table 10 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not

considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 10, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 10 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 13 and interpretations for dwellings without basements and for local roads and streets in table 12.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

James D. McCall, biologist, Soil Conservation Service, helped prepare this section.

Washington County has a large and varied population of fish and wildlife. White-tailed deer, squirrels, and raccoons inhabit the wooded areas. Quail, rabbits, groundhogs, and many types of songbirds inhabit the farmed areas, especially the fence rows, where they can find food and cover. The streams and lakes support smallmouth bass, bluegill, and many other sunfish. Some of the lakes and wetlands also provide resting and feeding sites for migrating waterfowl in fall and spring. The county supports a good population of fur-bearing animals, such as fox, coyotes, mink, muskrat, oppossum, raccoons, and skunks.

In many areas the wildlife habitat can be improved by measures that increase the food and water supply and the amount of cover. The soils that are best suited to habitat improvement are in the Crider-Frederick and Crider-Bedford map units, which are described under the heading "General Soil Map Units."

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 11, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places.

Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, soybeans, wheat, oats, sorghum, and sunflowers.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are orchardgrass, timothy, redtop, bromegrass, bluegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are lambsquarters, goldenrod, beggarweed, pokeweed, ragweed, wheatgrass, and broom sedge.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are maple, beech, oak, hickory, poplar, wild cherry, sweetgum, willow, black walnut, apple, hawthorn, dogwood, hazelnut, elderberry, and blackberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are autumn-olive, crabapple, and dogwood.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, cattail, arrowhead, buttonbush, willow, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, dove, meadowlark, field sparrow, killdeer, woodchuck, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and white-tailed deer.

Habitat for wetland wildlife consists of marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, rails, kingfishers, muskrat, mink, and beaver.

Edge habitat consists of areas where major land uses or cover types adjoin. A good example is the border between dense woodland and a field of no-till corn. Although not rated in the table, edge habitat is of primary importance to animals from the smallest songbirds to white-tailed deer. Most of the animals that inhabit openland or woodland also frequent edge habitat, and desirable edge areas are consistently used by 10 times as many wildlife as are the centers of large areas of woodland or cropland.

Engineering

Max L. Evans, state conservation engineer, Soil Conservation Service, helped prepare this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed

performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 12 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil),

shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 13 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 13 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 13 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 13 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 14 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 14, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or

Figure 14.—A lake in an area of Berks and Weikert soils.

soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 15 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to

overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment (fig. 14). Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

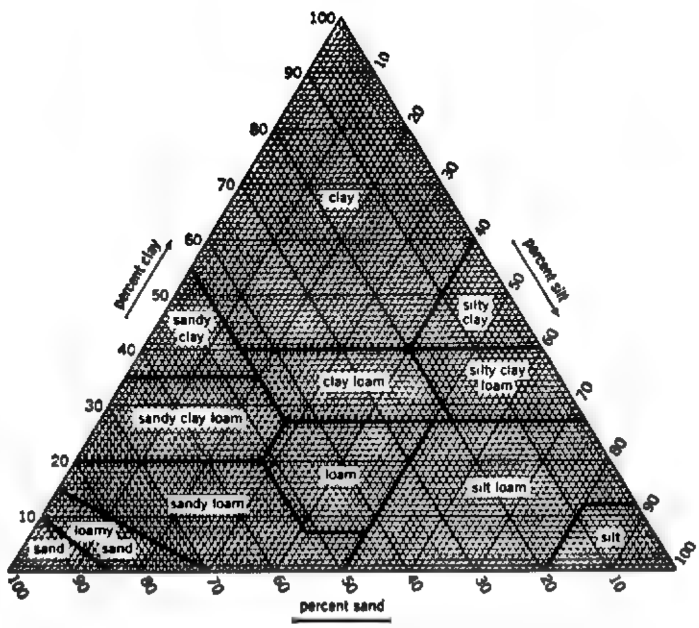

Figure 15.—Percentages of sand, silt, and clay in the basic USDA soil textural classes.

Engineering Index Properties

Table 16 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 15). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of

grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 17 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to

buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low,* a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Loamy soils that are less than 20 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Loamy soils that are 20 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to soil blowing.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 17, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 18 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 18, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 18 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 18 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 18.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*5*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Hapludalfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the underlying material can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*4*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*5*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alvin Series

The Alvin series consists of deep, well drained soils on terraces. These soils formed in loamy and sandy eolian material. Permeability is moderate in the solum and moderately rapid in the underlying material. Slopes range from 2 to 6 percent.

Alvin soils are similar to Bloomfield soils and are adjacent to Cuba soils. Bloomfield soils have less clay in the subsoil than the Alvin soils. Cuba soils have more silt in the subsoil than the Alvin soils. They are on the lower parts of the landscape.

Typical pedon of Alvin fine sandy loam, 2 to 6 percent slopes, in a cultivated field; 1,000 feet west and 600 feet south of the northeast corner of sec. 29, T. 4 N., R. 3 E.

Ap—0 to 10 inches; dark brown (10YR 4/3) fine sandy loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

Bt1—10 to 18 inches; strong brown (7.5YR 5/6) fine sandy loam; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; medium acid; clear wavy boundary.

Bt2—18 to 28 inches; dark brown (7.5YR 4/4) sandy clay loam; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous strong brown (7.5YR 5/6) clay films on faces of peds; medium acid; gradual wavy boundary.

Bt3—28 to 50 inches; dark brown (7.5YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; thin discontinuous dark brown (7.5YR 4/2) clay films on faces of peds; medium acid; gradual wavy boundary.

C—50 to 60 inches; yellowish brown (10YR 5/4) loamy sand; single grain; loose; few fine roots; few fine pores; medium acid.

The solum is 40 to 70 inches thick. It is strongly acid to neutral.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is sandy clay loam, fine sandy loam, or sandy loam. The C horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is sandy loam, loamy sand, loamy fine sand, or fine sand. In some pedons it is stratified.

Avonburg Series

The Avonburg series consists of deep, somewhat poorly drained, very slowly permeable soils on uplands. These soils formed in loess and in the underlying glacial till. Slopes range from 0 to 2 percent.

Avonburg soils are similar to Bartle and Dubois soils and are adjacent to Cincinnati, Hickory, and Rossmoyne soils. Bartle soils have more silt in the subsoil than the Avonburg soils. Dubois soils are underlain by lacustrine sediments. Cincinnati and Rossmoyne soils have a subsoil that is browner than that of the Avonburg soils. Hickory soils do not have a fragipan. Cincinnati and Hickory soils are on the higher parts of the landscape, and Rossmoyne soils are on the lower parts.

Typical pedon of Avonburg silt loam, 0 to 2 percent slopes, in a cultivated field; 2,000 feet west and 2,400 feet south of the northeast corner of sec. 19, T. 3 N., R. 6 E.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

E—7 to 11 inches; brown (10YR 5/3) silt loam; few medium faint light brownish gray (10YR 6/2) mottles; weak medium platy structure; friable; many fine roots; many fine pores; strongly acid; clear smooth boundary.

Bt—11 to 18 inches; yellowish brown (10YR 5/4) silt loam; many medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; thin discontinuous light brownish gray (10YR 6/2) clay films on faces of peds; thick continuous gray (10YR 6/1) silt coatings on faces of peds; very strongly acid; clear wavy boundary.

Btg—18 to 23 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous light brownish gray (10YR 6/2) clay films on faces of peds; thick continuous gray (10YR 6/1) silt coatings on faces of peds; very strongly acid; clear wavy boundary.

Btxg1—23 to 35 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/4) and few medium distinct yellowish brown (10YR 5/6) mottles; moderate very coarse prismatic structure; firm; brittle; few fine roots; few fine pores; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; thick continuous gray (10YR 6/1) silt coatings on faces of peds; very strongly acid; gradual wavy boundary.

2Btxg2—35 to 46 inches; light brownish gray (10YR 6/2) silt loam; many medium distinct yellowish brown (10YR 5/4) mottles; strong very coarse prismatic structure; firm; brittle; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; thick continuous gray (10YR 6/1) silt coatings on faces of peds; very strongly acid; gradual wavy boundary.

2Btg1—46 to 67 inches; light brownish gray (10YR 6/2) silt loam; many medium distinct yellowish brown (10YR 5/8) mottles; weak coarse prismatic structure; firm; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; an increase in content of sand; extremely acid; gradual wavy boundary.

2Btg2—67 to 80 inches; gray (10YR 6/1) silt loam; many medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; extremely acid.

The solum ranges from 60 to more than 80 inches in thickness. The loess mantle is 24 to 44 inches thick. The depth to the fragipan is 21 to 28 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 4. It is silt loam or silty clay loam. The Btx horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 1 to 6. It is silt loam, silty clay loam, or clay loam. The 2Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 6. It is loam or clay loam. Some pedons have a 2C horizon. This horizon has hue of 10YR, value of 5, and chroma of 4 to 6.

Bartle Series

The Bartle series consists of deep, somewhat poorly drained, very slowly permeable soils on terraces. These soils formed in acid, silty sediments of mixed origin. They are in areas of loess-mantled Illinoian drift underlain by shale and sandstone residuum. Slopes range from 0 to 2 percent.

These soils have a slightly lower base saturation than is definitive for the Bartle series. This difference, however, does not alter the usefulness or behavior of the soils.

Bartle soils are similar to Avonburg and Dubois soils and are adjacent to Cuba, Pekin, Peoga, and Stendal soils. Avonburg soils have less silt in the subsoil than the Bartle soils. Dubois soils are underlain by lacustrine material. Cuba, Peoga, and Stendal soils do not have a fragipan. Cuba and Stendal soils are on the lower flood plains. Peoga soils have a subsoil that is grayer than that of the Bartle soils. They are in the lower depressions. Pekin soils have a subsoil that is browner than that of the Bartle soils. They are on the slightly higher parts of the landscape.

Typical pedon of Bartle silt loam, in a cultivated field; 1,300 feet east and 1,400 feet south of the northwest corner of sec. 32, T. 2 N., R. 6 E.

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; moderate medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

Bt1—8 to 16 inches; pale brown (10YR 6/3) silt loam; common medium faint light gray (10YR 7/2) and few medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; strongly acid; clear smooth boundary.

Bt2—16 to 24 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; thin discontinuous light brownish gray (10YR 6/2) clay films on faces of peds; very strongly acid; clear smooth boundary.

Btxg1—24 to 38 inches; gray (10YR 6/1) silt loam; many medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure; firm; brittle; few fine roots; few fine pores; thin continuous grayish brown (10YR 5/2) clay films on faces of peds; many medium distinct black (10YR 2/1) iron and manganese oxide accumulations; very strongly acid; clear smooth boundary.

Btxg2—38 to 50 inches; gray (10YR 6/1) silt loam; many medium distinct yellowish brown (10YR 5/6) mottles; moderate very coarse prismatic structure; firm; brittle; thin discontinuous light brownish gray (10YR 6/2) clay films on faces of peds; many medium distinct black (10YR 2/1) iron and manganese oxide accumulations; strongly acid; gradual smooth boundary.

C—50 to 60 inches; yellowish brown (10YR 5/4) silt loam; many coarse distinct gray (10YR 6/1) mottles; massive; firm; many medium distinct black (10YR 2/1) iron and manganese oxide accumulations; strongly acid.

The solum is 50 to 70 inches thick. The depth to the fragipan is 24 to 34 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is neutral to strongly acid. Some pedons have an E horizon. This horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 4. It is neutral to strongly acid. The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The Btx horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 4. It is silt loam or silty clay loam. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 6. It is silty clay loam or silt loam and is stratified in some pedons. It is medium acid or strongly acid.

Baxter Variant

The Baxter Variant consists of deep, well drained, moderately permeable soils on uplands. These soils formed in a thin mantle of loess and in the underlying material weathered from cherty limestone. Slopes range from 4 to 12 percent.

Baxter Variant soils are adjacent to Crider and Frederick soils. The adjacent soils have fewer chert fragments in the solum than the Baxter soils. Also, Crider soils have a thicker mantle of loess. They are on the slightly higher parts of the landscape. Frederick soils are in landscape positions similar to those of the Baxter Variant soils.

Typical pedon of Baxter Variant very cherty silt loam, in a pastured area of Frederick-Baxter Variant complex, karst, 4 to 12 percent slopes, eroded; 250 feet east and 850 feet north of the southwest corner of sec. 17, T. 1 S., R. 4 E.

Ap—0 to 7 inches; dark brown (10YR 4/3) very cherty silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; about 10 to 15 percent yellowish brown (10YR 5/6) subsoil material; many fine roots; about 40 percent chert fragments; medium acid; abrupt smooth boundary.

Bt1—7 to 16 inches; yellowish brown (10YR 5/6) very cherty silt loam; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; thin discontinuous yellowish brown (10YR 5/4) clay films on faces of peds; about 54 percent chert fragments; medium acid; gradual wavy boundary.

Bt2—16 to 31 inches; red (2.5YR 5/6) very cherty clay; moderate medium angular blocky structure; very firm; many fine roots; many fine pores; thick continuous reddish brown (2.5YR 4/4) clay films on faces of peds; about 40 percent chert fragments; very strongly acid; gradual wavy boundary.

Bt3—31 to 48 inches; red (2.5YR 5/6) cherty clay; moderate medium angular blocky structure; very firm; common fine roots; common fine pores; thick continuous reddish brown (2.5YR 4/4) clay films on faces of peds; about 45 percent chert fragments; very strongly acid; gradual wavy boundary.

Bt4—48 to 61 inches; yellowish red (5YR 4/6) cherty clay loam; moderate medium angular blocky structure; very firm; common fine roots; common fine pores; thick continuous red (2.5YR 4/6) clay films on faces of peds; about 35 percent chert fragments; very strongly acid; gradual wavy boundary.

Bt5—61 to 74 inches; reddish brown (5YR 4/4) cherty sandy clay loam; moderate medium angular blocky structure; very firm; few fine roots; few fine pores; thick continuous reddish brown (5YR 4/4) clay films on faces of peds; about 30 percent chert fragments; very strongly acid; gradual wavy boundary.

BC—74 to 80 inches; yellowish red (5YR 5/6) cherty sandy clay loam; moderate coarse subangular blocky structure; firm; about 20 percent chert fragments; very strongly acid.

The solum is 70 to 100 inches thick. The loess mantle is 6 to 16 inches thick. The Bt horizon has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. It is very cherty silt loam, cherty clay, very cherty clay, or cherty sandy clay loam.

Bedford Series

The Bedford series consists of deep, moderately well drained soils on uplands. These soils formed in loess and in the underlying limestone residuum. They have a fragipan. Permeability is moderate above the fragipan and very slow in the fragipan. Slopes range from 0 to 12 percent.

These soils have a slightly higher base saturation and are slightly deeper to a layer that has a higher content of clay than is definitive for the Bedford series. These differences, however, do not alter the usefulness or behavior of the soils.

Bedford soils are similar to Zanesville soils and are adjacent to Bromer and Crider soils and to the Peoga soils that have a clayey substratum. Zanesville soils formed in loess over sandstone or siltstone residuum. Bromer, Crider, and Peoga soils do not have a fragipan. Bromer and Peoga soils have a subsoil that is grayer than that of the Bedford soils. They are in the lower depressional areas. Crider soils are in the lower areas.

Typical pedon of Bedford silt loam, 2 to 6 percent slopes, in a cultivated field; 100 feet south and 1,180 feet west of the northeast corner of sec. 15, T. 3 N., R. 2 E.

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

Bt1—9 to 14 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—14 to 20 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; many fine roots; many fine pores; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; medium acid; clear smooth boundary.

Bt3—20 to 24 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Btx1—24 to 37 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct light brownish gray (10YR 6/2) mottles on faces of prisms; moderate very coarse prismatic structure; very firm; brittle; few fine roots on faces of prisms; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; extremely acid; clear wavy boundary.

2Btx2—37 to 51 inches; yellowish brown (10YR 5/4) silt loam; many medium distinct light brownish gray (10YR 6/2) mottles on faces of prisms; moderate very coarse prismatic structure; firm; brittle; thin continuous yellowish brown (10YR 5/6) clay films on faces of peds; about 5 percent gravel; extremely acid; clear wavy boundary.

2Bt—51 to 80 inches; yellowish red (5YR 5/6), yellowish brown (10YR 5/6), and light brownish gray (10YR 6/2) silty clay; strong coarse angular blocky

structure; very firm; thick continuous reddish brown (5YR 4/4) clay films on faces of peds; about 5 percent gravel; strongly acid.

The solum is 50 to 90 inches thick. The loess mantle is 20 to 40 inches thick. The depth to the fragipan is 24 to 28 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is strongly acid to slightly acid. The Bt horizon also is strongly acid to slightly acid. It has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. The Btx horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is extremely acid to strongly acid. The 2Bt horizon has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 2 to 6.

Berks Series

The Berks series consists of moderately deep, well drained, moderately permeable or moderately rapidly permeable soils on uplands. These soils formed in material weathered from shale, siltstone, or sandstone. Slopes range from 18 to 75 percent.

Berks soils are similar to Weikert soils and are adjacent to Chetwynd, Ebal, and Wellston soils. Weikert soils have a solum that is thinner than that of the Berks soils. Chetwynd soils have more sand in the solum than the Berks soils. They are on the lower lying parts of the landscape. Ebal and Wellston soils have a solum that is more clayey and thicker than that of the Berks soils. They are in the same positions on the landscape as the Berks soils or are in the higher areas.

Typical pedon of Berks silt loam, in a wooded area of Berks-Weikert complex, 25 to 75 percent slopes; 1,250 feet north and 1,800 feet west of the southeast corner of sec. 6, T. 1 N., R. 6 E.

A—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many fine roots; about 13 percent sandstone fragments; very strongly acid; abrupt smooth boundary.

E—2 to 7 inches; brown (10YR 5/3) silt loam; moderate medium subangular blocky structure; friable; many fine roots; about 13 percent sandstone fragments; very strongly acid; gradual wavy boundary.

Bw—7 to 22 inches; yellowish brown (10YR 5/4) channery silt loam; weak medium subangular blocky structure; friable; common fine roots; common fine pores; about 33 percent sandstone fragments; very strongly acid; abrupt wavy boundary.

C—22 to 31 inches; yellowish brown (10YR 5/4) very channery silt loam; weak medium subangular blocky structure; friable; few fine roots; about 62 percent sandstone fragments; very strongly acid; abrupt smooth boundary.

R—31 inches; yellowish brown (10YR 5/8) sandstone bedrock.

The solum is 18 to 28 inches thick. Soft bedrock is at a depth of 20 to 40 inches. Reaction is medium acid to extremely acid throughout the profile.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The E horizon has hue of 10YR, value of 4 or 5, and chroma of 3. The Bw horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8.

Bloomfield Series

The Bloomfield series consists of deep, well drained, moderately rapidly permeable or rapidly permeable soils on uplands. These soils formed in sandy sediments of eolian origin. Slopes range from 6 to 40 percent.

Bloomfield soils are similar to Alvin soils and are adjacent to Berks, Gilpin, Weikert, and Wellston soils on the higher parts of the landscape. Alvin soils have more clay in the subsoil than the Bloomfield soils. Berks and Weikert soils have a solum that is thinner than that of the Bloomfield soils. Gilpin soils have less sand in the subsoil than the Bloomfield soils. Wellston soils have a mantle of loess.

Typical pedon of Bloomfield loamy fine sand, 18 to 40 percent slopes, in a wooded area; 925 feet west and 2,175 feet south of the northeast corner of sec. 20, T. 4 N., R. 3 E.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) loamy fine sand, grayish brown (10YR 5/2) dry; single grain; loose; many fine roots; slightly acid; abrupt smooth boundary.

E1—6 to 18 inches; dark yellowish brown (10YR 4/4) loamy sand; single grain; loose; many fine roots; slightly acid; clear smooth boundary.

E2—18 to 32 inches; yellowish brown (10YR 5/4) loamy sand; single grain; loose; many fine roots; medium acid; clear smooth boundary.

E&Bt1—32 to 50 inches; yellowish brown (10YR 5/4) fine sand (E); single grain; loose; lamellae and bands of dark brown (7.5YR 4/4) loamy fine sand (Bt); weak fine subangular blocky structure; friable; wavy and discontinuous lamellae 1/8 to 1/4 inch thick in the upper part; bands 1 to 2 inches thick in the lower part; total thickness of bands is about 4 inches; medium acid; gradual wavy boundary.

E&Bt2—50 to 65 inches; dark brown (7.5YR 4/4) loamy fine sand (Bt) occurring as nearly continuous bands; weak medium subangular blocky structure; friable; interbands of yellowish brown (10YR 5/4) fine sand (E); single grain; loose; total thickness of loamy fine sand bands (Bt) is about 8 inches; medium acid.

The solum is 46 to 90 inches thick. It is strongly acid to slightly acid.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. The Ap horizon, if it occurs, has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The E horizon has hue of 10YR, value of 4 to 6, and chroma of 3 or 4. It is loamy fine sand, loamy sand, or fine sand. The E part of the E&Bt horizon has hue of 10YR, value of 5, and chroma of 4 to 6. It is fine sand or loamy fine sand. The Bt part has hue of 7.5YR or 10YR and value and chroma of 3 or 4. It is sandy loam or loamy fine sand. Some pedons have a C horizon. This horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is sandy loam, fine sand, or loamy sand.

Bonnie Series

The Bonnie series consists of deep, poorly drained, moderately slowly permeable soils on flood plains. These soils formed in acid, silty alluvium. Slopes range from 0 to 2 percent.

Bonnie soils are similar to Peoga soils and are adjacent to Stendal soils. Peoga soils have more clay in the subsoil than the Bonnie soils. Stendal soils have a subsoil that is browner than that of the Bonnie soils. They are on the higher parts of the landscape.

Typical pedon of Bonnie silt loam, frequently flooded, in a wooded area; 1,600 feet east and 2,250 feet north of the southwest corner of sec. 14, T. 1 N., R. 5 E.

A—0 to 7 inches; pale brown (10YR 6/3) silt loam, very pale brown (10YR 7/3) dry; common coarse faint light brownish gray (10YR 6/2) mottles; moderate medium granular structure; friable; many medium roots; very strongly acid; abrupt smooth boundary.

Cg1—7 to 24 inches; light brownish gray (10YR 6/2) silt loam; many medium distinct brownish yellow (10YR 6/6) mottles; massive; friable; many fine roots; many fine pores; very strongly acid; clear smooth boundary.

Cg2—24 to 33 inches; light brownish gray (10YR 6/2) silt loam; many medium distinct light gray (10YR 7/1) and brownish yellow (10YR 6/6) mottles; massive; friable; common fine roots; common fine pores; very strongly acid; clear smooth boundary.

Cg3—33 to 42 inches; light gray (10YR 6/1) silt loam; many medium distinct reddish yellow (7.5YR 6/8) mottles; massive; friable; few fine roots; few fine pores; very strongly acid; clear smooth boundary.

Cg4—42 to 60 inches; light gray (10YR 7/1) silt loam; many medium distinct strong brown (7.5YR 5/6) mottles; massive; firm; very strongly acid.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. The Cg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2.

Bromer Series

The Bromer series consists of deep, somewhat poorly drained, slowly permeable soils on uplands. These soils formed in loess, silty sediments, and limestone residuum. Slopes range from 0 to 2 percent.

Bromer soils are similar to McGary soils and are adjacent to Bedford and Crider soils and to the Peoga soils that have a clayey substratum. McGary soils have more clay in the subsoil than the Bromer soils. Bedford soils have a fragipan. They are on the slightly higher parts of the landscape. Crider soils have a subsoil that is browner than that of the Bromer soils, and Peoga soils have one that is grayer. Crider soils are on the higher parts of the landscape, and Peoga soils are in the lower depressional areas.

Typical pedon of Bromer silt loam, in a pasture; 1,200 feet west and 1,400 feet south of the northeast corner of sec. 34, T. 2 N., R. 2 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

BE—8 to 15 inches; brown (10YR 5/3) silt loam; common medium faint light brownish gray (10YR 6/2) and few fine faint yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; neutral; clear wavy boundary.

Btg1—15 to 28 inches; light gray (10YR 7/1) silt loam; many medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; thin continuous light gray (10YR 7/2) clay films on faces of peds; strongly acid; clear wavy boundary.

2Btg2—28 to 36 inches; gray (10YR 5/1) silty clay loam; many medium distinct strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; firm; common fine roots; common fine pores; thin continuous gray (10YR 5/1) clay films on faces of peds; very strongly acid; clear wavy boundary.

2Btg3—36 to 62 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct light gray (10YR 7/1) mottles; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous gray (10YR 5/1) clay films on faces of peds; strongly acid; clear wavy boundary.

2Btg4—62 to 80 inches; gray (10YR 5/1) silty clay; many medium distinct dark brown (7.5YR 4/4) mottles; moderate medium angular blocky structure; firm; few fine roots; few fine pores; thin continuous gray (10YR 5/1) clay films on faces of peds; very strongly acid.

The solum is 80 to 100 inches thick. The loess mantle is 20 to 40 inches thick.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is slightly acid or neutral. The BE horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The Btg horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 4. It is strongly acid or very strongly acid. The 2Btg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 8. It is silty clay loam, silty clay, or clay.

Burnside Series

The Burnside series consists of deep, well drained, moderately permeable soils on flood plains. These soils formed in silty and channery alluvium over sandstone, siltstone, and shale. Slopes range from 0 to 2 percent.

Burnside soils are adjacent to Berks, Cuba, Stendal, and Weikert soils. Berks and Weikert soils have a solum that is thinner than that of the Burnside soils. They are on the higher parts of the landscape. Cuba and Stendal soils are on the lower parts. Cuba soils have more clay and fewer coarse fragments in the solum than the Burnside soils. Stendal soils have a subsoil that is grayer than that of the Burnside soils.

Typical pedon of Burnside silt loam, occasionally flooded, in a cultivated field; 1,200 feet east and 1,100 feet north of the southwest corner of sec. 33, T. 4 N., R. 4 E.

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; about 3 percent sandstone fragments; medium acid; abrupt smooth boundary.

Bw1—9 to 16 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; friable; common fine roots; common fine pores; about 10 percent sandstone fragments; strongly acid; clear smooth boundary.

Bw2—16 to 27 inches; yellowish brown (10YR 5/4) channery loam; weak fine subangular blocky structure; friable; common fine roots; few fine pores; about 30 percent sandstone fragments; very strongly acid; clear smooth boundary.

C—27 to 50 inches; yellowish brown (10YR 5/4) very channery loam; massive; about 60 percent sandstone fragments; very strongly acid; clear smooth boundary.

2R—50 inches; light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) sandstone bedrock.

The solum is 16 to 40 inches thick. Bedrock is at a depth of 40 to 60 inches.

The Ap, B, and C horizons have hue of 10YR and value of 4 or 5. The Ap horizon has chroma of 2 or 3. The B horizon has chroma of 3 or 4. The C horizon has chroma of 4. It is silt loam, loam, or the channery or very channery analogs of these textures. It is very strongly acid or strongly acid.

Caneyville Series

The Caneyville series consists of moderately deep, well drained, moderately slowly permeable soils on uplands. These soils formed in a thin mantle of loess and in the underlying limestone residuum. Slopes range from 12 to 50 percent.

Caneyville soils are similar to Ebal and Hagerstown soils and are adjacent to Bedford and Crider soils on the higher parts of the landscape. Ebal, Crider, and Hagerstown soils have a solum that is thicker than that of the Caneyville soils. Also, Crider soils have a thicker mantle of loess. Bedford soils have a fragipan.

Typical pedon of Caneyville silt loam, in a pastured area of Hagerstown-Caneyville silt loams, 12 to 18 percent slopes, eroded; 800 feet north and 1,400 feet east of the southwest corner of sec. 11, T. 1 N., R. 4 E.

Ap—0 to 5 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; about 10 to 15 percent strong brown (7.5YR 5/6) subsoil material; many fine roots; slightly acid; abrupt smooth boundary.

Bt1—5 to 11 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; many fine roots; many fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; abrupt smooth boundary.

Bt2—11 to 21 inches; yellowish red (5YR 5/6) silty clay; moderate medium angular blocky structure; very firm; common fine roots; common fine pores; thick continuous reddish brown (5YR 4/4) clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt3—21 to 30 inches; yellowish red (5YR 5/6) clay; moderate very coarse angular blocky structure; very firm; few fine roots; few fine pores; thick continuous reddish brown (5YR 4/4) clay films on faces of peds; strongly acid; abrupt smooth boundary.

R—30 inches; limestone bedrock.

The solum is 24 to 38 inches thick. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The upper part of the Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. The lower Bt part has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay loam, silty clay, or clay.

Chetwynd Series

The Chetwynd series consists of deep, well drained, moderately permeable soils on high terraces. These soils formed in loamy outwash. Slopes range from 8 to 35 percent.

These soils have a slightly higher reaction and a slightly higher base saturation than is definitive for the Chetwynd series. These differences, however, do not alter the usefulness or behavior of the soils.

Chetwynd soils are similar to Gilpin and Wellston soils and are adjacent to Berks and Weikert soils. Gilpin and Wellston soils formed in residuum or in loess and the underlying sandstone or shale residuum. Berks and Weikert soils have a solum that is thinner than that of the Chetwynd soils. They are on the higher parts of the landscape.

Typical pedon of Chetwynd loam, 18 to 35 percent slopes, in a wooded area; 2,150 feet west and 2,050 feet south of the northeast corner of sec. 34, T. 4 N., R. 4 E.

A—0 to 4 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

Bt1—4 to 26 inches; strong brown (7.5YR 5/6) loam; weak fine subangular blocky structure; friable; many fine roots; many fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—26 to 38 inches; brown (7.5YR 5/4) clay loam; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt3—38 to 56 inches; yellowish red (5YR 5/6) clay loam; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous reddish brown (5YR 5/4) clay films on faces of peds; medium acid; clear wavy boundary.

Bt4—56 to 66 inches; reddish brown (5YR 5/4) sandy clay loam; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; thin continuous reddish brown (5YR 4/4) clay films on faces of peds; medium acid; clear wavy boundary.

Bt5—66 to 80 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; thin continuous red (2.5YR 4/6) clay films on faces of peds; strongly acid.

The solum is 70 to more than 80 inches thick. The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Some pedons have an E horizon, which has hue of 10YR, value of 5, and chroma of 3 or 4. The Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is loam, clay loam, or sandy clay loam. Some pedons have a C horizon, which has hue of 7.5YR or 5YR and value and chroma of 4 to 6.

Cincinnati Series

The Cincinnati series consists of deep, well drained soils on uplands. These soils formed in loess and in the underlying glacial till. They have a fragipan. Permeablility is moderate above the fragipan and slow or moderately slow in and below the fragipan. Slopes range from 2 to 12 percent.

Cincinnati soils are adjacent to Avonburg, Hickory, and Rossmoyne soils. Avonburg and Rossmoyne soils have a subsoil that is grayer than that of the Cincinnati soils. They are on the higher parts of the landscape. Hickory soils do not have a fragipan. They are on the lower, steeper parts of the landscape.

Typical pedon of Cincinnati silt loam, 6 to 12 percent slopes, eroded, in a pasture; 1,300 feet east and 2,500 feet south of the northwest corner of sec. 19, T. 3 N., R. 6 E.

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; about 10 to 15 percent yellowish brown (10YR 5/4) subsoil material; many fine roots; neutral; clear wavy boundary.

BE—6 to 14 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; extremely acid; clear wavy boundary.

Bt—14 to 24 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Btx1—24 to 38 inches; yellowish brown (10YR 5/4) silt loam; many medium distinct light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure; very firm; brittle; few fine roots; few fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; extremely acid; clear wavy boundary.

2Btx2—38 to 50 inches; yellowish brown (10YR 5/6) silt loam; many medium distinct light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure; very firm; brittle; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; few medium black (10YR 2/1) iron and manganese oxide accumulations; about 3 percent gravel; very strongly acid; clear wavy boundary.

2Bt1—50 to 64 inches; yellowish brown (10YR 5/4) loam; common medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; many medium black (10YR 2/1) iron and manganese oxide accumulations; about 3 percent gravel; medium acid; clear wavy boundary.

2Bt2—64 to 80 inches; yellowish brown (10YR 5/6) clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; many medium black (10YR 2/1) iron and manganese oxide accumulations; about 3 percent gravel; neutral.

The solum ranges from 49 to 100 inches in thickness. The loess mantle is 20 to 39 inches thick. The depth to the fragipan is 18 to 28 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The Bt and 2Btx horizons have hue of 7.5YR or 10YR, value of 5, and chroma of 4 to 6. The 2Btx horizon is silt loam, clay loam, loam, or silty clay loam. The 2Bt horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4 to 6. Some pedons have a 2C horizon, which has hue of 10YR, value of 5, and chroma of 3 to 6.

Crider Series

The Crider series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in loess and in the underlying limestone residuum. Slopes range from 2 to 22 percent.

Crider soils are adjacent to Baxter Variant, Bedford, Frederick, and Hagerstown soils. Baxter Variant and Frederick soils are on the slightly lower parts of the landscape. They have a loess mantle that is thinner than that of the Crider soils. Also, Baxter Variant soils have more chert fragments in the solum, and Frederick soils have more clay in the subsoil. Bedford soils have a fragipan. They are in the higher areas. Hagerstown soils have a solum that is more clayey and thinner than that of the Crider soils. They are on the lower parts of the landscape.

Typical pedon of Crider silt loam, 6 to 12 percent slopes, eroded, in a cultivated field; 1,500 feet north and 200 feet west of the southeast corner of sec. 15, T. 1 N., R. 2 E.

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; about 10 percent strong brown (7.5YR 5/6) subsoil material; many fine roots; slightly acid; abrupt smooth boundary.

Bt1—6 to 16 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; many fine roots; many fine pores; thin continuous yellowish red (5YR 4/6) clay films in root channels and on faces of peds; strongly acid; clear wavy boundary.

Bt2—16 to 26 inches; strong brown (7.5YR 5/6) silty clay loam; few medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; many fine roots; many fine pores; thick continuous yellowish red (5YR 4/6) clay films on faces of peds; strongly acid; clear wavy boundary.

2Bt3—26 to 44 inches; reddish brown (5YR 4/4) silty clay; moderate medium angular blocky structure; very firm; few fine roots; few fine pores; thin continuous strong brown (7.5YR 5/6) clay films on faces of peds; strongly acid; clear wavy boundary.

2Bt4—44 to 63 inches; red (2.5YR 4/6) clay; moderate medium angular blocky structure; very firm; thick continuous reddish brown (2.5YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

2Bt5—63 to 80 inches; red (2.5YR 4/6) clay; moderate medium angular blocky structure; very firm; thick continuous yellowish brown (10YR 5/4) clay films on faces of peds; slightly acid.

The solum is 64 to more than 80 inches thick. The loess mantle is 20 to 40 inches thick.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is strongly acid to neutral. Some pedons have a BA horizon. This horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is slightly acid or neutral. The Bt and 2Bt horizons are very strongly acid to slightly acid. The Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 6. The 2Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 to 6.

Cuba Series

The Cuba series consists of deep, well drained, moderately permeable soils on flood plains. These soils formed in acid alluvium. Slopes range from 0 to 2 percent.

These soils have slightly less clay and a slightly thicker solum than is definitive for the Cuba series. These differences, however, do not alter the usefulness or behavior of the soils.

Cuba soils are similar to Haymond and Nolin soils and are adjacent to Bartle, Burnside, Pekin, and Stendal soils. Haymond soils are less acid than the Cuba soils. Nolin soils have more clay in the subsoil than the Cuba soils. Bartle, Pekin, and Stendal soils have a subsoil that is grayer than that of the Cuba soils. Bartle and Pekin soils have a fragipan. They are on the higher parts of the landscape. Stendal soils are on the lower parts. Burnside soils have a solum that is thinner than that of the Cuba soils. Also, they have a higher content of coarse fragments. They are on the slightly higher parts of the landscape.

Typical pedon of Cuba silt loam, frequently flooded, in a cultivated field; 1,000 feet north and 200 feet east of the southwest corner of sec. 14, T. 1 N., R. 5 E.

Ap—0 to 12 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium

granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

Bw1—12 to 24 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure; friable; many fine roots; many fine pores; strongly acid; clear smooth boundary.

Bw2—24 to 46 inches; yellowish brown (10YR 5/4) silt loam; few fine faint pale brown (10YR 6/3) mottles; weak fine subangular blocky structure; friable; common fine roots; common fine pores; very strongly acid; clear smooth boundary.

C—46 to 60 inches; yellowish brown (10YR 5/4) silt loam; few medium faint pale brown (10YR 6/3) mottles; massive; friable; few fine roots; few fine pores; very strongly acid.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is neutral to very strongly acid. The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It generally is strongly acid or very strongly acid, but in a few pedons it is medium acid. The C horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is strongly acid or very strongly acid.

Dubois Series

The Dubois series consists of deep, somewhat poorly drained soils on lake plains. These soils formed in loess and in the underlying lacustrine deposits. They have a fragipan. Permeability is moderate above the fragipan and very slow in and below the fragipan. Slopes range from 0 to 2 percent.

Dubois soils are similar to Avonburg and Bartle soils and are adjacent to Haubstadt and Otwell soils. Avonburg soils are underlain by glacial till. They are on uplands. Bartle soils contain less clay in the subsoil than the Dubois soils. They are on terraces. Haubstadt and Otwell soils have a subsoil that is browner than that of the Dubois soils. They are on the steeper parts of the landscape.

Typical pedon of Dubois silt loam, 0 to 2 percent slopes, in a cultivated field; 40 feet east and 1,900 feet south of the northwest corner of sec. 7, T. 3 N., R. 6 E.

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

BE—8 to 14 inches; brown (10YR 5/3) silt loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; many fine roots; many fine pores; slightly acid; clear smooth boundary.

Bt—14 to 22 inches; yellowish brown (10YR 5/4) silt loam; many medium distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; thin discontinuous yellowish brown (10YR 5/4) and thin continuous light brownish gray (10YR 6/2) clay films on faces of peds; very strongly acid; clear wavy boundary.

Btxg1—22 to 32 inches; light brownish gray (10YR 6/2) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate very coarse prismatic structure; firm; few fine roots; few fine pores; thin continuous gray (10YR 6/1) clay films on faces of peds; very strongly acid; clear wavy boundary.

Btxg2—32 to 46 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct strong brown (7.5YR 4/6) mottles; firm; thin continuous gray (10YR 6/1) clay films on faces of peds; very strongly acid; gradual wavy boundary.

B't—46 to 72 inches; yellowish brown (10YR 5/6) silt loam; many medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; thin continuous light brownish gray (10YR 6/2) clay films on faces of peds; very strongly acid; gradual wavy boundary.

2C—72 to 80 inches; yellowish brown (10YR 5/6) stratified silt loam and silty clay loam; many medium distinct light brownish gray (10YR 6/2) mottles; massive; firm; very strongly acid.

The solum is 62 to 80 inches thick. The loess mantle is 20 to 40 inches thick. The depth to the fragipan is 18 to 24 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The BE horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The Bt, Btx, and B't horizons are silt loam or silty clay loam. The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 4. The Btx horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 1 to 6. The B't horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 6. The 2C horizon has hue of 10YR, value of 5, and chroma of 4 to 6.

Ebal Series

The Ebal series consists of deep, moderately well drained soils on uplands. These soils formed in loess over material weathered from interbedded shale and sandstone. They are moderately slowly permeable in the upper part and very slowly permeable in the lower part. Slopes range from 18 to 50 percent.

Ebal soils are similar to Caneyville and Hagerstown soils and are adjacent to Berks, Gilpin, and Wellston soils. Caneyville and Hagerstown soils formed in a thin mantle of loess and in the underlying limestone residuum. Berks, Gilpin, and Wellston soils have a solum that is thinner than that of the Ebal soils. Also, they have less clay in the subsoil. Berks and Gilpin soils are on the lower, steeper side slopes, and Wellston soils are on the higher parts of the landscape.

Typical pedon of Ebal silt loam, in a wooded area of Gilpin-Berks-Ebal complex, 18 to 50 percent slopes; 2,500 feet north and 2,200 feet east of the southwest corner of sec. 11, T. 1 N., R. 2 E.

A—0 to 4 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; about 5 percent sandstone fragments; strongly acid; abrupt smooth boundary.

BE—4 to 9 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; many fine roots; many fine pores; about 10 percent sandstone fragments; very strongly acid; clear wavy boundary.

Bt1—9 to 14 inches; brown (7.5YR 5/4) channery silty clay loam; weak medium angular blocky structure; very firm; many fine roots; many fine pores; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; about 20 percent sandstone fragments; very strongly acid; clear wavy boundary.

Bt2—14 to 22 inches; brown (7.5YR 5/4) channery silty clay; moderate medium angular blocky structure; very firm; common fine roots; common fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; about 20 percent sandstone fragments; medium acid; clear wavy boundary.

2Bt3—22 to 42 inches; brown (7.5YR 5/4) clay; moderate coarse angular blocky structure; very firm; few fine roots; few fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; medium acid; clear wavy boundary.

2Bt4—42 to 64 inches; yellowish brown (10YR 5/6) clay; many medium distinct light brownish gray (10YR 6/2) mottles; moderate coarse angular blocky structure; very firm; few fine roots; few fine pores; thick continuous yellowish brown (10YR 5/4) clay films on faces of peds; neutral; clear wavy boundary.

2Cr—64 inches; gray (7.5YR 6/1) clayey shale; many medium distinct strong brown (7.5YR 5/6) mottles; massive; very firm; neutral.

The solum is 50 to more than 80 inches thick. The A horizon has hue of 10YR, value of 4, and chroma of 2 or 3. It is silt loam or loam. The BE horizon, if it occurs, also is silt loam or loam. It has hue of 10YR, value of 5 or 6, and chroma of 3 to 6. The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. The 2Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is silty clay loam or clay.

Elkinsville Series

The Elkinsville series consists of deep, well drained, moderately permeable soils on terraces. These soils formed in acid material derived from Illinoian glacial drift and in shale and sandstone residuum. Slopes range from 2 to 12 percent.

Elkinsville soils are adjacent to Bartle, Cuba, and Haymond soils. Bartle soils have a subsoil that is grayer than that of the Elkinsville soils and have a fragipan. They are on the lower terraces. Cuba and Haymond soils formed in alluvium on the lower bottom land.

Typical pedon of Elkinsville silt loam, 6 to 12 percent slopes, eroded, in a cultivated field; 1,800 feet north and 1,800 feet west of the southeast corner of sec. 35, T. 2 N., R. 4 E.

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; moderate medium granular structure; friable; about 10 to 15 percent strong brown (7.5YR 4/6) subsoil material; many fine roots; medium acid; abrupt smooth boundary.

Bt1—6 to 18 inches; strong brown (7.5YR 4/6) silty clay loam; moderate medium subangular blocky structure; firm; many fine roots; many fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—18 to 29 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

2Bt3—29 to 42 inches; strong brown (7.5YR 4/6) clay loam; weak medium subangular blocky structure; firm; few fine roots; few fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

2C—42 to 60 inches; brown (7.5YR 5/4) loam; massive; friable; few fine roots; few fine pores; strongly acid.

The solum is 40 to 50 inches thick. Some pedons have an E horizon. The Ap and E horizons have hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The Ap horizon is medium acid to neutral. The E horizon is strongly acid or medium acid. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is silt loam or silty clay loam. The 2Bt horizon has colors similar to those of the Bt horizon. It is clay loam or sandy clay loam. It is strongly acid or very strongly acid. The 2C horizon is loam, sandy loam, silty clay loam, or silt loam. It is strongly acid or medium acid.

Frederick Series

The Frederick series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in a thin mantle of loess and in the underlying cherty limestone residuum. Slopes range from 6 to 22 percent.

These soils have a slightly higher base saturation than is definitive for the Frederick series. This difference,

however, does not alter the usefulness or behavior of the soils.

Frederick soils are adjacent to Baxter Variant and Crider soils. Baxter Variant soils have more chert fragments in the solum than the Frederick soils. They are in the same positions on the landscape as the Frederick soils. Crider soils have a loess mantle that is thicker than that of the Frederick soils. They are on the slightly higher parts of the landscape.

Typical pedon of Frederick silt loam, karst, 12 to 22 percent slopes, eroded, in a pasture; 2,500 feet south and 2,000 feet west of the northeast corner of sec. 4, T. 1 S., R. 3 E.

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; common medium distinct pockets of strong brown (7.5YR 4/6) silty clay loam; moderate medium granular structure; friable; about 10 to 15 percent yellowish red (5YR 5/6) subsoil material; many fine roots; about 2 percent chert fragments; slightly acid; clear smooth boundary.

Bt1—6 to 9 inches; yellowish red (5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; thin continuous strong brown (7.5YR 5/6) clay films on faces of peds; thick continuous dark yellowish brown (10YR 4/4) worm casts in channels; about 2 percent chert fragments; slightly acid; clear wavy boundary.

Bt2—9 to 18 inches; yellowish red (5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; thick continuous yellowish red (5YR 4/6) clay films on faces of peds; about 2 percent chert fragments; medium acid; clear wavy boundary.

2Bt3—18 to 32 inches; red (2.5YR 4/6) silty clay; strong medium angular blocky structure; very firm; common fine roots; thick continuous dark red (2.5YR 3/6) clay films on faces of peds; about 2 percent chert fragments; strongly acid; clear wavy boundary.

2Bt4—32 to 43 inches; red (2.5YR 4/6) clay; strong medium angular blocky structure; very firm; few fine roots; thick continuous dark red (2.5YR 3/6) clay films on faces of peds; about 2 percent chert fragments; strongly acid; clear wavy boundary.

2Bt5—43 to 60 inches; red (2.5YR 4/8) clay; few medium distinct strong brown (7.5YR 5/8) mottles; strong medium angular blocky structure; very firm; few fine roots; thick continuous dark red (2.5YR 3/6) clay films on faces of peds; about 3 percent chert fragments; strongly acid; clear wavy boundary.

2Bt6—60 to 70 inches; red (2.5YR 4/8) and brownish yellow (10YR 6/6) clay; moderate medium angular blocky structure; very firm; few fine roots; thick continuous dark red (2.5YR 3/6) clay films on faces of peds; about 3 percent chert fragments; strongly acid; clear wavy boundary.

2Bt7—70 to 80 inches; red (2.5YR 4/8) and strong brown (7.5YR 5/8) clay; moderate medium angular blocky structure; very firm; thick continuous dark red (2.5YR 3/6) clay films on faces of peds; about 1 percent chert fragments; very strongly acid.

The solum ranges from 70 to more than 80 inches in thickness. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is loam or silt loam. The Bt and 2Bt horizons have hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. They are silty clay loam, silty clay, or clay.

Gilpin Series

The Gilpin series consists of moderately deep, well drained, moderately permeable soils on uplands. These soils formed in siltstone, shale, or sandstone residuum. Slopes range from 12 to 50 percent.

Gilpin soils are similar to Chetwynd and Wellston soils and are adjacent to Ebal and Zanesville soils. All of the similar and adjacent soils have a solum that is thicker than that of the Gilpin soils. Also, Ebal soils have more clay in the subsoil. Chetwynd soils formed in outwash. Zanesville soils have a fragipan. Ebal, Wellston, and Zanesville soils are on the higher parts of the landscape.

Typical pedon of Gilpin loam, in a pastured area of Gilpin-Berks loams, 18 to 50 percent slopes; 200 feet west and 800 feet north of the southeast corner of sec. 4, T. 1 N., R. 2 E.

A—0 to 3 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many fine roots; about 5 percent sandstone fragments; medium acid; abrupt smooth boundary.

AB—3 to 6 inches; yellowish brown (10YR 5/4) channery loam; weak medium granular structure; friable; many fine roots; about 20 percent sandstone fragments; medium acid; clear wavy boundary.

BA—6 to 15 inches; light yellowish brown (10YR 6/4) channery loam; weak medium subangular blocky structure; friable; many fine roots; about 25 percent sandstone fragments; medium acid; clear wavy boundary.

Bt1—15 to 24 inches; yellowish brown (10YR 5/4) loam; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; thin discontinuous yellowish brown (10YR 5/4) clay films on faces of peds; about 5 percent sandstone fragments; strongly acid; clear wavy boundary.

Bt2—24 to 30 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; about 10 percent coarse fragments; very strongly acid; clear wavy boundary.

Cr—30 inches; red (2.5YR 4/6) and light yellowish brown (10YR 6/4), soft, fine grained sandstone.

The solum is 20 to 31 inches thick. Soft bedrock is at a depth of 24 to 31 inches.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is silt loam, loam, silty clay loam, or the channery analogs of these textures. Some pedons have a C horizon, which has hue of 10YR and value and chroma of 4 to 6. The Bt and C horizons are extremely acid to medium acid.

Hagerstown Series

The Hagerstown series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in a thin mantle of loess and in the underlying limestone residuum. Slopes range from 6 to 25 percent.

Hagerstown soils are similar to Caneyville soils and are adjacent to Bedford and Crider soils. Caneyville soils have a solum that is thinner than that of the Hagerstown soils. Bedford and Crider soils are on the higher parts of the landscape. Bedford soils have a fragipan. Crider soils have a mantle of loess that is thicker than that of the Hagerstown soils.

Typical pedon of Hagerstown silt loam, in a pastured area of Hagerstown-Caneyville silt loams, 12 to 18 percent slopes, eroded; 400 feet north and 1,500 feet east of the southwest corner of sec. 11, T. 1 S., R. 4 E.

Ap—0 to 5 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; about 10 to 15 percent strong brown (7.5YR 5/6) subsoil material; many fine roots; very strongly acid; abrupt smooth boundary.

Bt1—5 to 16 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; many fine roots; many fine pores; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—16 to 25 inches; red (2.5YR 4/6) clay; moderate medium angular blocky structure; firm; common fine roots; common fine pores; thick continuous reddish brown (2.5YR 4/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt3—25 to 36 inches; red (2.5YR 4/6) clay; moderate medium angular blocky structure; very firm; few fine roots; few fine pores; thick continuous reddish brown (2.5YR 4/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt4—36 to 44 inches; strong brown (7.5YR 4/6) clay; strong coarse angular blocky structure; very firm; thick continuous dark brown (7.5YR 4/4) clay films on faces of peds; common medium distinct very dark gray (10YR 3/1) iron and manganese oxide accumulations; neutral; clear wavy boundary.

R—44 inches; light gray (10YR 7/1) limestone bedrock.

The solum is 42 to 60 inches thick. The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam or silty clay loam. Some pedons have a BA horizon, which has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The Bt horizon has hue of 7.5YR, 5YR, or 2.5YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay, clay, or silty clay loam.

Haubstadt Series

The Haubstadt series consists of deep, moderately well drained, slowly permeable soils on lake plains. These soils formed in loess and in the underlying lacustrine deposits. Slopes range from 2 to 6 percent.

Haubstadt soils are similar to Pekin and Rossmoyne soils and are adjacent to Dubois and Otwell soils. Pekin soils have a lower base saturation than the Haubstadt soils. Rossmoyne soils formed in loess and in the underlying glacial till. Dubois soils have a subsoil that is grayer than that of the Haubstadt soils. They are on the lower parts of the landscape. Otwell soils have a subsoil that is browner than that of the Haubstadt soils. They are on the higher, steeper parts of the landscape.

Typical pedon of Haubstadt silt loam, 2 to 6 percent slopes, in a cultivated field; 100 feet east and 1,100 feet south of the northwest corner of sec. 12, T. 3 N., R. 5 E.

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

Bt1—8 to 15 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; medium acid; clear wavy boundary.

Bt2—15 to 24 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm; many fine roots; common fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; extremely acid; clear wavy boundary.

Btx—24 to 40 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct gray (10YR 6/1) mottles; moderate very coarse prismatic structure; firm; brittle; few fine roots; few fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; extremely acid; clear wavy boundary.

2Bt1—40 to 54 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; thin continuous brown (7.5YR 4/4) clay films on faces of

peds; about 2 percent gravel; very strongly acid; clear wavy boundary.

2Bt2—54 to 68 inches; strong brown (7.5YR 4/6) silty clay loam; moderate medium subangular blocky structure; firm; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; about 2 percent gravel; very strongly acid; clear wavy boundary.

2Bt3—68 to 80 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; about 2 percent gravel; medium acid.

The solum is 55 to more than 80 inches thick. The loess mantle is 24 to 40 inches thick. The depth to the fragipan is 20 to 24 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Some pedons have an E or BE horizon. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3. The BE horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam. The Btx and 2Bt horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The Btx horizon is silty clay loam, silt loam, or loam. The 2Bt horizon is loam or silty clay loam. Some pedons have a 2C horizon. This horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 6. It is loam or clay loam.

Haymond Series

The Haymond series consists of deep, well drained, moderately permeable soils on flood plains. These soils formed in alluvium. Slopes range from 0 to 2 percent.

Haymond soils are similar to Cuba and Nolin soils and are adjacent to Bedford, Crider, Hagerstown, and Wakeland soils. Cuba soils are more acid than the Haymond soils. Nolin soils have more clay in the subsoil than the Haymond soils. Bedford, Crider, and Hagerstown soils are on the higher parts of the landscape. Bedford soils have a fragipan. Crider and Hagerstown soils formed in loess and in the underlying limestone residuum. Wakeland soils have a subsoil that is grayer than that of the Haymond soils. They are on the lower parts of the landscape.

Typical pedon of Haymond silt loam, frequently flooded, in a cultivated field; 2,000 feet west and 2,000 feet north of the southeast corner of sec. 34, T. 1 N., R. 4 E.

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

Bw1—10 to 20 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; many fine roots; many fine pores; neutral; clear smooth boundary.

Bw2—20 to 29 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; many fine roots; many fine pores; slightly acid; clear smooth boundary.

Bw3—29 to 47 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; common fine roots; common fine pores; medium acid; clear smooth boundary.

C—47 to 60 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; few fine roots; few fine pores; very strongly acid.

The solum is 40 to 50 inches thick. It is medium acid to neutral. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The Bw and C horizons have hue of 10YR, value of 4 to 6, and chroma of 3 or 4.

Hickory Series

The Hickory series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in loess and in the underlying glacial till. Slopes range from 12 to 18 percent.

Hickory soils are adjacent to Avonburg, Cincinnati, and Rossmoyne soils. The adjacent soils have a fragipan. Avonburg and Rossmoyne soils have a subsoil that is grayer than that of the Hickory soils. They are on the lower parts of the landscape. Cincinnati soils are on the higher parts.

Typical pedon of Hickory silt loam, 12 to 18 percent slopes, eroded, in a pasture; 1,630 feet east and 1,800 feet north of the southwest corner of sec. 19, T. 3 N., R. 6 E.

Ap—0 to 4 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; about 10 to 15 percent yellowish brown (10YR 5/4) subsoil material; many fine roots; neutral; abrupt smooth boundary.

Bt1—4 to 9 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; firm; many fine roots; many fine pores; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—9 to 28 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; firm; many fine roots; common fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt3—28 to 42 inches; strong brown (7.5YR 5/6) clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; common fine roots; common fine pores; thick continuous dark brown (7.5YR 4/4)

clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt4—42 to 50 inches; yellowish brown (10YR 5/6) clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; many medium black (10YR 2/1) manganese oxide accumulations; very strongly acid; clear wavy boundary.

C—50 to 60 inches; yellowish brown (10YR 5/4) clay loam; many medium distinct gray (10YR 6/1) mottles; massive; firm; medium acid.

The solum is 40 to 60 inches thick. The loess mantle is 0 to 19 inches thick.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3. The Bt horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 to 6. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

Markland Series

The Markland series consists of deep, well drained, slowly permeable soils on lacustrine terraces. These soils formed in a thin mantle of loess and in the underlying lacustrine sediments. Slopes range from 2 to 8 percent.

Markland soils are adjacent to McGary and Zipp soils. The adjacent soils have a subsoil that is grayer than that of the Markland soils. They are on the lower parts of the landscape.

Typical pedon of Markland silt loam, 2 to 8 percent slopes, in a cultivated field; 1,100 feet west and 2,550 feet south of the northeast corner of sec. 20, T. 4 N., R. 4 E.

Ap—0 to 7 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

Bt1—7 to 12 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; many fine roots; many fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—12 to 30 inches; yellowish brown (10YR 5/4) silty clay; moderate medium angular blocky structure; very firm; common fine roots; common fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; slightly acid; clear wavy boundary.

C1—30 to 40 inches; yellowish brown (10YR 5/4) silty clay loam that has thin strata of silt loam; massive; firm; few fine roots; few fine pores; slight effervescence; moderately alkaline; clear wavy boundary.

C2—40 to 60 inches; yellowish brown (10YR 5/4) silty clay loam that has thin strata of silt loam; common medium distinct light brownish gray (10YR 6/2) mottles; massive; firm; strong effervescence; moderately alkaline.

The solum is 22 to 38 inches thick. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam or silty clay loam. The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. The C horizon has hue of 10YR, value of 5, and chroma of 2 to 4.

McGary Series

The McGary series consists of deep, somewhat poorly drained, slowly permeable or very slowly permeable soils on lacustrine terraces. These soils formed in stratified lacustrine sediments. Slopes range from 0 to 2 percent.

McGary soils are similar to Bromer soils and are adjacent to Markland and Zipp soils. Bromer soils have less clay in the solum than the McGary soils. Markland soils do not have grayish mottles in the upper part of the solum. They are on the higher parts of the landscape. Zipp soils have a grayish subsoil. They are on the lower parts of the landscape.

Typical pedon of McGary silt loam, 0 to 2 percent slopes, in a cultivated field; 1,700 feet south and 2,000 feet west of the northeast corner of sec. 36, T. 4 N., R. 2 E.

Ap—0 to 7 inches; brown (10YR 5/3) silt loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

Bt1—7 to 14 inches; light brownish gray (10YR 6/2) silty clay loam; common medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; thin discontinuous light brownish gray (10YR 6/2) clay films on faces of peds; many fine roots; many fine pores; neutral; clear smooth boundary.

Bt2—14 to 22 inches; yellowish brown (10YR 5/4) silty clay; many medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; very firm; many fine roots; many fine pores; thin continuous light brownish gray (10YR 6/2) clay films on faces of peds; neutral; clear smooth boundary.

Bt3—22 to 28 inches; yellowish brown (10YR 5/4) silty clay; many medium distinct light brownish gray (10YR 6/2) and pale brown (10YR 6/3) mottles; moderate coarse angular blocky structure; very firm; common fine roots; common fine pores; thick

continuous light brownish gray (10YR 6/2) clay films on faces of peds; neutral; clear smooth boundary.

Bt4—28 to 34 inches; yellowish brown (10YR 5/4) silty clay; few fine faint pale brown (10YR 6/3) mottles; moderate coarse angular blocky structure; very firm; common fine roots; common fine pores; thin continuous light brownish gray (10YR 6/2) clay films on faces of peds; common medium distinct black (10YR 2/1) iron and manganese oxide accumulations; mildly alkaline; clear smooth boundary.

C—34 to 60 inches; light brownish gray (10YR 6/2) silty clay that has thin strata of silty clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; massive; very firm; slight effervescence; moderately alkaline.

The solum is 25 to 38 inches thick. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The Bt horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. It is silty clay loam or silty clay and is stratified in some pedons.

Montgomery Series

The Montgomery series consists of deep, very poorly drained, slowly permeable soils on lacustrine terraces and in depressions on uplands. These soils formed in stratified, moderately fine textured and fine textured lacustrine deposits. Slopes range from 0 to 2 percent.

Montgomery soils are adjacent to Bromer soils and to the Peoga soils that have a clayey substratum. The adjacent soils do not have a thick, dark surface layer. They are on the slightly higher parts of the landscape.

Typical pedon of Montgomery silty clay loam, in a cultivated field; 800 feet east and 900 feet north of the southwest corner of sec. 35, T. 2 N., R. 2 E.

Ap—0 to 11 inches; very dark brown (10YR 2/2) silty clay loam, dark grayish brown (10YR 4/2) dry; moderate medium angular blocky structure; very firm; many fine roots; many fine pores; neutral; abrupt smooth boundary.

A—11 to 15 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium angular blocky structure; firm; many fine roots; many fine pores; neutral; clear smooth boundary.

Bg1—15 to 23 inches; very dark gray (10YR 3/1) silty clay; many fine faint very dark grayish brown (2.5Y 3/2) mottles; moderate coarse angular blocky structure; very firm; many fine roots; many fine pores; neutral; clear wavy boundary.

Bg2—23 to 37 inches; dark gray (10YR 4/1) silty clay; many fine distinct olive brown (2.5Y 4/4) and common medium distinct yellowish brown (10YR 5/4) mottles; moderate coarse angular blocky structure; very firm; common fine roots; common fine pores; thin continuous dark gray (10YR 4/1) clay films on faces of peds; neutral; clear wavy boundary.

Cg—37 to 46 inches; gray (10YR 6/1) silty clay loam; many medium prominent yellowish brown (10YR 5/8) mottles; massive; firm; neutral; clear wavy boundary.

C—46 to 60 inches; yellowish brown (10YR 5/4) silty clay; many medium distinct yellowish brown (10YR 5/8) and gray (10YR 6/1) mottles; massive; very firm; mildly alkaline.

The solum is 36 to 42 inches thick. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The Bg horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 or 2. It is silty clay or silty clay loam. The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 4. It is silty clay or silty clay loam and is stratified in some pedons.

Nolin Series

The Nolin series consists of deep, well drained, moderately permeable soils on flood plains. These soils formed in alluvium. Slopes range from 0 to 2 percent.

Nolin soils are similar to Cuba and Haymond soils. Cuba soils are more acid than the Nolin soils. Haymond soils have less clay in the subsoil than the Nolin soils.

Typical pedon of Nolin silt loam, frequently flooded, in a cultivated field; 450 feet east and 1,600 feet north of the southwest corner of sec. 34, T. 4 N., R. 2 E.

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; mildly alkaline; abrupt smooth boundary.

Bw1—10 to 30 inches; brown (10YR 5/3) silt loam; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; mildly alkaline; gradual smooth boundary.

Bw2—30 to 52 inches; brown (10YR 4/3) silt loam; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; mildly alkaline; gradual smooth boundary.

C—52 to 60 inches; brown (10YR 5/3) silt loam; massive; friable; few fine roots; few fine pores; mildly alkaline.

The solum is 45 to 60 inches thick. It is moderately alkaline to medium acid. The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3. The Bw and C horizons have hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

Otwell Series

The Otwell series consists of deep, well drained, very slowly permeable soils on lake plains. These soils

formed in loess and in the underlying lacustrine and outwash deposits. Slopes range from 6 to 12 percent.

Otwell soils are similar to Cincinnati soils and are adjacent to Dubois and Haubstadt soils. Cincinnati soils are on uplands. Dubois and Haubstadt soils have a subsoil that is grayer than that of the Otwell soils. Dubois soils are in the lower areas on broad flats. The gently sloping Haubstadt soils are on the lower side slopes.

Typical pedon of Otwell silt loam, 6 to 12 percent slopes, eroded, in a cultivated field; 1,800 feet east and 600 feet north of the southwest corner of sec. 7, T. 3 N., R. 6 E.

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; about 10 to 15 percent yellowish brown (10YR 5/6) subsoil material; slightly acid; abrupt smooth boundary.

Bt1—6 to 12 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—12 to 22 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; many fine roots; common fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

Btx1—22 to 36 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure; firm; few fine roots; few fine pores; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

2Btx2—36 to 48 inches; yellowish brown (10YR 5/4) loam; many medium distinct light gray (10YR 7/2) mottles; moderate very coarse prismatic structure; firm; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

2Bt—48 to 66 inches; yellowish brown (10YR 5/6) stratified silt loam and silty clay loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate medium subangular blocky structure; firm; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; strongly acid; clear wavy boundary.

2C—66 to 80 inches; yellowish brown (10YR 5/6) stratified silt loam and silty clay loam; common medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/4) mottles; massive; firm; neutral.

The thickness of the solum ranges from 40 to 80 inches. The thickness of the loess ranges from 18 to 40 inches. The depth to the fragipan is 18 to 28 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 3 or 4. The Bt horizon has hue of 10YR, value of 5, and chroma of 4 to 6. The 2Btx horizon has hue of 10YR, value of 5, and chroma of 4 to 6. It is loam, clay loam, or silty clay loam. The 2Bt horizon has hue of 10YR, value of 5, and chroma of 4 to 6.

Pekin Series

The Pekin series consists of deep, moderately well drained soils on alluvial terraces. These soils formed in acid, silty sediments. They have a fragipan. Permeability is moderate above the fragipan and very slow in the fragipan. Slopes range from 0 to 12 percent.

These soils have a slightly lower base saturation than is definitive for the Pekin series. This difference, however, does not alter the usefulness or behavior of the soils.

Pekin soils are similar to Haubstadt and Rossmoyne soils and are adjacent to Bartle, Peoga, and Stendal soils. Haubstadt and Rossmoyne soils have a solum that is more than 60 inches thick. Rossmoyne soils have a base saturation that is higher than that of the Pekin soils. Bartle, Peoga, and Stendal soils have a subsoil that is grayer than that of the Pekin soils. Peoga and Stendal soils do not have a fragipan. Bartle and Peoga soils are on the slightly lower parts of the landscape. Stendal soils are on the lower parts.

Typical pedon of Pekin silt loam, 2 to 6 percent slopes, in a cultivated field; 1,400 feet west and 2,300 feet south of the northeast corner of sec. 19, T. 1 N., R. 5 E.

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

Bt1—9 to 15 inches; light yellowish brown (10YR 6/4) silt loam; moderate medium subangular blocky structure; friable; many fine roots; many fine pores; thin discontinuous yellowish brown (10YR 5/4) clay films on faces of peds; neutral; clear smooth boundary.

Bt2—15 to 27 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; many fine roots; many fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; very strongly acid; clear smooth boundary.

Btx1—27 to 35 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure; firm; brittle; few fine roots; few fine pores;

thin continuous brown (10YR 5/3) clay films on faces of peds; extremely acid; gradual wavy boundary.

Btx2—35 to 44 inches; yellowish brown (10YR 5/4) silt loam; many medium distinct light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure; firm; brittle; thin continuous gray (10YR 6/1) clay films on faces of peds; extremely acid; gradual wavy boundary.

C—44 to 60 inches; yellowish brown (10YR 5/6) silt loam; many medium distinct light brownish gray (10YR 6/2) mottles; massive; firm; very strongly acid.

The solum is 40 to 57 inches thick. The depth to the fragipan is 24 to 28 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. It is neutral to medium acid. Some pedons have a BE horizon. This horizon has hue of 10YR, value of 5 or 6, and chroma of 4. It is neutral to very strongly acid. The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 6. It generally is strongly acid or very strongly acid but ranges to neutral in the upper part. The Btx horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 8. It is slightly acid to extremely acid. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 6. It is silt loam or silty clay loam and is commonly stratified. It is very strongly acid to neutral.

Peoga Series

The Peoga series consists of deep, poorly drained, slowly permeable soils on terraces. These soils formed in loess and in the underlying acid, silty sediments derived from Illinoian drift and from shale and sandstone residuum. Slopes range from 0 to 2 percent.

These soils have a slightly lower base saturation than is definitive for the Peoga series. This difference, however, does not alter the usefulness or behavior of the soils.

Peoga soils are similar to Bonnie soils and are adjacent to Bartle, Bedford, and Bromer soils on the higher parts of the landscape. Bonnie soils have less clay in the subsoil than the Peoga soils. Bartle and Bedford soils have a fragipan. Bartle soils are not so gray in the subsoil as the Peoga soils. Bromer soils have a subsoil that is browner than that of the Peoga soils.

Typical pedon of Peoga silt loam, in a cultivated field; 600 feet south and 2,500 feet east of the northwest corner of sec. 6, T. 1 N., R. 6 E.

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; few fine faint yellowish brown (10YR 5/4) mottles; moderate medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

Btg1—8 to 18 inches; gray (10YR 6/1) silt loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; many fine roots; many fine pores; very strongly acid; clear smooth boundary.

Btg2—18 to 28 inches; gray (10YR 6/1) silt loam; many medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; thin continuous gray (10YR 6/1) clay films on faces of peds; extremely acid; clear smooth boundary.

Btg3—28 to 45 inches; gray (10YR 6/1) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; thin discontinuous gray (10YR 6/1) clay films on faces of peds; extremely acid; clear smooth boundary.

Btg4—45 to 55 inches; gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; thin discontinuous gray (10YR 6/1) clay films on faces of peds; extremely acid; clear smooth boundary.

Cg—55 to 60 inches; gray (10YR 6/1) silt loam; common medium distinct yellowish brown (10YR 5/8) mottles; massive; firm; few fine roots; few fine pores; very strongly acid.

The thickness of the solum ranges from 48 to 72 inches. The Ap horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Some pedons have an E horizon, which has hue of 10YR, value of 5 or 6, and chroma of 1 or 2. The Btg horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2. It is silt loam or silty clay loam. It is strongly acid to extremely acid. The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 or 2. It is silty clay loam or silt loam and is stratified in some pedons. It is slightly acid to very strongly acid. Peoga silt loam, clayey substratum, does not have a low base saturation.

Rossmoyne Series

The Rossmoyne series consists of deep, moderately well drained, slowly permeable or moderately slowly permeable soils on uplands. These soils formed in loess and in the underlying glacial till. Slopes range from 2 to 6 percent.

Rossmoyne soils are similar to Haubstadt and Pekin soils and are adjacent to Avonburg, Cincinnati, and Hickory soils. Haubstadt soils are on lake plains. Pekin soils are on terraces. Avonburg soils have a subsoil that is grayer than that of the Rossmoyne soils. They are on the higher, flatter parts of the landscape. Cincinnati and Hickory soils are on the lower, steeper parts of the landscape. Cincinnati soils have a subsoil that is browner

than that of the Rossmoyne soils. Hickory soils do not have a fragipan.

Typical pedon of Rossmoyne silt loam, 2 to 6 percent slopes, in a pasture; 1,600 feet north and 1,500 feet west of the southeast corner of sec. 19, T. 3 N., R. 6 E.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

BE—8 to 12 inches; yellowish brown (10YR 5/4) silt loam; weak medium granular structure; friable; many fine roots; slightly acid; clear wavy boundary.

Bt1—12 to 18 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; many fine roots; many fine pores; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—18 to 24 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm; many fine roots; common fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

Btx1—24 to 34 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct gray (10YR 5/1) mottles; moderate very coarse prismatic structure; firm; few fine roots; few fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

2Btx2—34 to 54 inches; strong brown (7.5YR 5/6) clay loam; many medium distinct light brownish gray mottles; moderate very coarse prismatic structure; firm; few fine roots; few fine pores; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

2Bt—54 to 70 inches; strong brown (7.5YR 5/6) clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; about 2 percent gravel; medium acid; clear wavy boundary.

2C—70 to 80 inches; yellowish brown (10YR 5/6) clay loam; many medium distinct light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) mottles; massive; firm; about 5 percent gravel; slightly acid.

The solum is 60 to 80 inches thick. The loess mantle is 18 to 40 inches thick. The depth to the fragipan is 20 to 26 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Some pedons have an E horizon, which has hue of 10YR, value or 5 or 6, and chroma of 3. The Bt horizon has hue of 10YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam, silty clay loam, or clay loam. The Btx and 2Bt horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The Btx horizon is silty clay loam, clay loam, or loam. The 2Bt and 2C horizons are loam or clay loam. The 2C horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 6.

Stendal Series

The Stendal series consists of deep, somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in acid alluvium. Slopes range from 0 to 2 percent.

These soils contain slightly less clay than is definitive for the Stendal series. This difference, however, does not alter the usefulness or behavior of the soils.

Stendal soils are similar to Wakeland soils and are adjacent to Bartle, Cuba, and Zipp soils. Wakeland soils are less acid than the Stendal soils. Bartle soils have a fragipan. They are on the higher terraces. Cuba soils have a subsoil that is browner than that of the Stendal soils. They are on the slightly higher parts of the landscape. Zipp soils have a subsoil that is grayer and more clayey than that of the Stendal soils. They are on the slightly lower parts of the landscape.

Typical pedon of Stendal silt loam, frequently flooded, in a cultivated field; 1,100 feet north and 100 feet west of the southeast corner of sec. 16, T. 1 N., R. 5 E.

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; slightly acid; clear smooth boundary.

Cg1—10 to 24 inches; grayish brown (10YR 5/2) silt loam; many medium distinct dark brown (10YR 4/3) mottles; weak medium granular structure; friable; many fine roots; many fine pores; very strongly acid; gradual smooth boundary.

Cg2—24 to 60 inches; gray (10YR 6/1) silt loam; common medium distinct yellowish brown (10YR 5/6) and many medium distinct pale brown (10YR 6/3) mottles; weak medium granular structure; friable; common fine roots; common fine pores; very strongly acid.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is slightly acid to very strongly acid. The C horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 3. It is strongly acid or very strongly acid.

Wakeland Series

The Wakeland series consists of deep, somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in alluvium. Slopes range from 0 to 2 percent.

Wakeland soils are similar to Stendal soils and are adjacent to Bedford, Crider, and Haymond soils. Stendal soils are more acid than the Wakeland soils. Bedford

and Crider soils are on the higher parts of the landscape. Bedford soils have a fragipan. Crider soils formed in loess and in the underlying limestone residuum. Haymond soils have a subsoil that is browner than that of the Wakeland soils. They are on the slightly higher parts of the landscape.

Typical pedon of Wakeland silt loam, frequently flooded, in a cultivated field; 1,700 feet east and 2,475 feet north of the southwest corner of sec. 34, T. 1 N., R. 4 E.

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; few fine faint dark brown (7.5YR 4/4) and light brownish gray (10YR 6/2) mottles; moderate medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

C—10 to 18 inches; brown (10YR 5/3) silt loam; many medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; massive; friable; many fine roots; many fine pores; slightly acid; clear smooth boundary.

Cg1—18 to 37 inches; grayish brown (10YR 5/2) silt loam; many medium distinct yellowish brown (10YR 5/6) mottles; massive; friable; common fine roots; common fine pores; neutral; clear smooth boundary.

Cg2—37 to 47 inches; gray (10YR 5/1) silt loam; many medium distinct yellowish brown (10YR 5/4) mottles; massive; friable; common fine roots; common fine pores; neutral; clear smooth boundary.

C'—47 to 60 inches; brown (10YR 5/3) silt loam; many medium distinct yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) mottles; massive; friable; few fine roots; few fine pores; neutral.

The soils are medium acid to neutral throughout. The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The C horizon has hue of 10YR, value of 5 or 6, and chroma of 1 to 3.

Weikert Series

The Weikert series consists of shallow, well drained, moderately rapidly permeable soils on uplands. These soils formed in material weathered from shale, siltstone, and sandstone. Slopes range from 25 to 75 percent.

Weikert soils are similar to Berks soils and are adjacent to Gilpin, Wellston, and Zanesville soils. The similar and adjacent soils have a solum that is thicker than that of the Weikert soils. Also, the moderately deep Gilpin and deep Wellston and Zanesville soils have more clay in the subsoil. They are on the higher parts of the landscape.

Typical pedon of Weikert channery silt loam, in a wooded area of Berks-Weikert complex, 25 to 75 percent slopes; 450 feet east and 1,600 feet north of the southwest corner of sec. 31, T. 2 N., R. 6 E.

A—0 to 3 inches; dark grayish brown (10YR 4/2) channery silt loam, light brownish gray (10YR 6/2) dry; weak medium granular structure; friable; many fine roots; about 30 percent sandstone fragments; very strongly acid; clear smooth boundary.

Bw—3 to 12 inches; dark brown (10YR 4/3) very channery silt loam; weak fine subangular blocky structure; friable; many fine pores; about 45 percent sandstone fragments; very strongly acid; gradual wavy boundary.

R—12 inches; fractured, grayish brown (2.5Y 5/2), strongly acid sandstone.

The solum is 12 to 15 inches thick. The depth to bedrock is 15 to 20 inches. The content of coarse fragments ranges from 15 to 30 percent in the A horzion and from 35 to 50 percent in the Bw horizon. These fragments are siltstone, sandstone, and shale.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The Bw horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. It is channery silt loam or very channery silt loam.

Wellston Series

The Wellston series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in loess and in sandstone or shale residuum. Slopes range from 6 to 18 percent.

Wellston soils are similar to Chetwynd and Gilpin soils and are adjacent to Berks and Weikert soils. Chetwynd soils formed in loamy outwash. Gilpin, Berks, and Weikert soils have a solum that is thinner than that of the Wellston soils. Also, Gilpin soils have more sand in the subsoil, Berks soils have less clay in the subsoil, and Weikert soils have a higher content of coarse fragments. Berks and Weikert soils are on the lower, steeper side slopes.

Typical pedon of Wellston silt loam, 12 to 18 percent slopes, in a pasture; 600 feet east and 1,400 feet north of the southwest corner of sec. 22, T. 2 N., R. 5 E.

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; neutral; abrupt wavy boundary.

BE—6 to 12 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; many fine roots; many fine pores; slightly acid; clear smooth boundary.

Bt1—12 to 21 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium subangular blocky structure; friable; common fine roots; common fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; medium acid; abrupt wavy boundary.

Bt2—21 to 29 inches; yellowish brown (10YR 5/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; about 2 percent sandstone fragments; very strongly acid; clear wavy boundary.

2BC—29 to 37 inches; yellowish brown (10YR 5/4) channery silt loam; weak fine subangular blocky structure; friable; few fine roots; few fine pores; about 20 percent sandstone fragments; very strongly acid; clear wavy boundary.

2C—37 to 52 inches; yellowish brown (10YR 5/4) channery silt loam; weak fine subangular blocky structure; friable; about 30 percent sandstone fragments; very strongly acid; clear wavy boundary.

3R—52 inches; yellowish brown (10YR 5/6), fine grained sandstone.

The solum is 32 to 48 inches thick. The loess mantle is 20 to 40 inches thick. The depth to soft sandstone bedrock is 40 to 55 inches.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. The BE horizon has hue of 10YR, value of 5, and chroma of 4 to 6. The Bt horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4 to 6. The 2BC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is loam, channery loam, silt loam, or channery or very channery silt loam. The 2C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is clay loam, loam, silt loam, or the channery or very channery analogs of these textures.

Zanesville Series

The Zanesville series consists of deep, moderately well drained and well drained soils on uplands. These soils formed in loess over sandstone or siltstone residuum. They have a fragipan. Permeability is moderate above the fragipan and moderately slow or slow in and below the fragipan. Slopes range from 1 to 12 percent.

Zanesville soils are similar to Bedford soils and are adjacent to Berks and Gilpin soils. Bedford soils have a solum that is thicker than that of the Zanesville soils. They formed in loess and in the underlying limestone residuum. Berks and Gilpin soils are on the lower, steeper side slopes. They do not have a fragipan. Berks soils have less clay in the subsoil than the Zanesville soils.

Typical pedon of Zanesville silt loam, 1 to 6 percent slopes, in a pasture; 2,600 feet north and 2,600 feet west of the southeast corner of sec. 11, T. 1 N., R. 2 E.

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) silt loam, light yellowish brown (10YR 6/4) dry; weak medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

Bt1—7 to 14 inches; dark yellowish brown (10YR 4/6) silt loam; moderate medium subangular blocky structure; firm; many fine roots; many fine pores; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; neutral; clear smooth boundary.

Bt2—14 to 20 inches; strong brown (7.5YR 5/6) silty clay loam; common medium distinct pale brown (10YR 6/3) and light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm; many fine roots; many fine pores; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; very strongly acid; clear smooth boundary.

Btx1—20 to 26 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct gray (10YR 6/1) mottles; moderate coarse prismatic structure; firm; brittle; few fine pores; thin continuous yellowish brown (10YR 5/4) clay films on faces of prisms; very strongly acid; gradual smooth boundary.

2Btx2—26 to 48 inches; yellowish brown (10YR 5/6) clay loam; many medium distinct light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure; firm; brittle; thin discontinuous yellowish brown (10YR 5/4) clay films on faces of prisms; about 2 percent sandstone fragments; very strongly acid; gradual smooth boundary.

2BC—48 to 56 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint yellowish brown (10YR 5/6) mottles; massive; firm; thin continuous strong brown (7.5YR 5/6) clay films on faces of prisms; about 5 percent sandstone fragments; very strongly acid; clear smooth boundary.

3R—56 inches; strong brown (7.5YR 5/6), fine grained sandstone.

The solum is 42 to 60 inches thick. It is strongly acid or very strongly acid in unlimed areas. The depth to bedrock is 42 to 65 inches. The loess mantle is 20 to 40 inches thick. The depth to the fragipan is 20 to 28 inches.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. Some pedons have a BA horizon, which has hue of 10YR, value of 5, and chroma of 4 to 6. The Bt horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. The Btx and 2Btx horizons have hue of 10YR, value of 5 or 6, and chroma of 4 to 6. They are silt loam, silty clay loam, or clay loam.

Zipp Series

The Zipp series consists of deep, very poorly drained, slowly permeable soils on lacustrine terraces. These soils formed in stratified lacustrine sediments. Slopes range from 0 to 2 percent.

Zipp soils are adjacent to Markland, McGary, and Stendal soils. Markland and McGary soils are on the

higher parts of the landscape. They have a subsoil that is browner than that of the Zipp soils. Also, McGary soils have more clay in the subsoil. Stendal soils have a solum that is browner than that of the Zipp soils and have less clay in the underlying material. They are on the lower parts of the landscape.

Typical pedon of Zipp silty clay, in a cultivated field; 400 feet south and 1,400 feet east of the northwest corner of sec. 27, T. 4 N., R. 4 E.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silty clay, light brownish gray (10YR 6/2) dry; moderate medium angular blocky structure; firm; many fine roots; slightly acid; abrupt smooth boundary.

Bg1—8 to 19 inches; gray (10YR 5/1) silty clay; many medium distinct yellowish brown (10YR 5/4) mottles; moderate medium angular blocky structure; very firm; many fine roots; many fine pores; neutral; clear wavy boundary.

Bg2—19 to 42 inches; gray (10YR 5/1) silty clay; many medium distinct yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; very firm; common fine roots; common fine pores; thin discontinuous dark gray (10YR 4/1) clay films on faces of peds; neutral; clear wavy boundary.

Cg—42 to 60 inches; gray (10YR 5/1) silty clay; many medium distinct yellowish brown (10YR 5/6) mottles; massive; very firm; slight effervescence; moderately alkaline.

The solum is 36 to 48 inches thick. The Ap horizon has hue of 10YR, value of 4, and chroma of 1 or 2. The Bg horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 1. The Cg horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 1 or 2. It is neutral to moderately alkaline.

Formation of the Soils

This section relates the major factors of soil formation to the soils in the county. It also describes the process of soil formation.

Factors of Soil Formation

Soils form through the processes that act on deposited or accumulated geologic material. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material; the climate under which the soil material accumulated and has existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time that the forces of soil formation have acted on the soil material.

Climate and plant and animal life, chiefly plants, are active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material affects the kind of soil profile that forms and, in extreme cases, determines it almost entirely. Finally, time is needed for the transformation of the parent material into a soil that has genetically related horizons. Some time is always required for the differentiation of horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effects of any one factor unless conditions are specified for the other four.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. The parent materials in Washington County are Illinoian glacial till and outwash; Illinoian and Wisconsinan lacustrine deposits, or lakebed material; limestone, sandstone, and shale residuum; alluvium; and loess and sandy eolian deposits of Wisconsinan age.

The soils in Washington County formed mainly in material weathered from the underlying bedrock. The bedrock strata nearest the surface are sedimentary rocks of Upper, Middle, and Lower Mississippian age. The formations of Middle Mississippian age include St. Genevieve, St. Louis, Salem, and Harrodsburg limestone, which underlies most of the county. The limestone is thick enough to be quarried in most areas. Crider and Hagerstown soils formed in material weathered from limestone and from the clastic rocks that are above the limestone in the geologic column.

One area in the county has a well developed karst topography that is characterized by sinkholes and relatively low relief. This area is called the Mitchell Plain. Almost all of the water received as rainfall in the area disappears rapidly. Some goes underground through funnel-shaped sinkholes, but most is removed by streams. The streams that originate on the Mitchell Plain drain into shallow holes within a few miles. Caverns are common. They are frequently flooded. Crider and Frederick soils formed on the Mitchell Plain.

The bedrock formations of Upper Mississippian age include interbedded shale, sandstone, siltstone, and limestone. They are extensive on the Crawford Upland, in the western part of the county. Berks, Ebal, Gilpin, Wellston, and Zanesville soils formed in material weathered mainly from sandstone, siltstone, and shale.

The formations of Lower Mississippian age include interbedded shale, sandstone, siltstone, and thin strata of limestone. They are on the Norman Uplands, in the northern part and eastern quarter of the county. These uplands are commonly called the "knobs." Berks, Gilpin, Wellston, and Weikert soils formed in material weathered mainly from sandstone, siltstone, and shale.

Lacustrine material was deposited from still, or ponded, glacial meltwater. Because the coarser particles dropped out of moving water as outwash, only the finer particles, such as very fine sand, silt, and clay, remained to settle out in still water. Lacustrine deposits are silty or clayey. Zipp soils formed in lacustrine material.

A small area in the northeastern part of the county was glaciated. This area is known as the Scottsburg Lowlands. It was covered by the Illinoian glacier approximately 150,000 to 200,000 years ago.

Glacial till is material laid down directly by glaciers with a minimum of water action. It consists of particles of different sizes that are mixed together. Some of the small pebbles in glacial till have sharp corners, indicating that they have not been worn by water. Cincinnati soils formed in glacial till.

Outwash material was deposited by running water from melting glaciers. The size of the particles that make up outwash varies, depending on the velocity of the water that carried the material. When the water slowed down,

the coarser particles were deposited. Finer particles, such as very fine sand, silt, and clay, were carried by the more slowly moving water. Outwash deposits generally occur as layers of similar-size particles. Chetwynd soils are an example of soils that formed in outwash.

Stream terraces, or level benches above stream bottoms, are along the Blue River and its tributaries. These terraces formed when the river increased in size because of the melting of glaciers during the Pleistocene. Bartle and Pekin soils formed on these terraces.

Alluvial material was recently deposited by floodwater along present streams. This material varies in texture, depending on the speed of the water from which it was deposited. Cuba, Haymond, Stendal, and Wakeland are examples of soils that formed in alluvium.

A few areas in the extreme northwest part of the county are covered by sandy eolian material of Wisconsinan age. This material was deposited 10,000 to 20,000 years ago. Alvin and Bloomfield are examples of soils that formed in this material.

A mantle of loess, generally a few inches to a few feet thick, has been deposited throughout most of the county. The upper part of most of the soils formed in this material. Loess is made up of dominantly silt-size particles deposited by the wind. The point of contact between the loess and the underlying residuum generally is distinct and can be easily distinguished where the soil profile is exposed. Bedford, Crider, and Wellston soils have a thin mantle of loess over an older, commonly eroded buried soil, which is called a paleosol.

Plant and Animal Life

Plants have been the principal organisms influencing the soils in Washington County. Bacteria, fungi, and earthworms, however, also have been important. The chief contribution of plant and animal life to soil formation is the addition of organic matter and nitrogen to the soil. The kind of organic material on and in the soil depends on the kinds of native plants that grew on the soil. The remains of these plants accumulated on the surface, decayed, and eventually became humus. The roots of the plants provided channels for the downward movement of water through the soil and added organic matter as they decayed. Bacteria in the soil help to break down the organic matter into plant nutrients.

The native vegetation in Washington County was mainly deciduous trees. Differences in natural soil drainage and minor variations in the kind of parent material affected the composition of the forest species. The well drained soils, such as Crider, Hagerstown, and Wellston soils, mainly supported American beech, sugar maple, ash, hickory, oak, and yellow-poplar. The wet soils supported oak and sweetgum. In a few wet areas, sphagnum and other mosses contributed substantially to the accumulation of organic matter. Montgomery soils formed under wet conditions and contain a considerable amount of organic matter.

The vegetation was fairly uniform throughout the county. Thus, major differences among the soils cannot be explained on the basis of differences in vegetation. Although some comparatively minor variations in the vegetation are associated with different soils, these variations probably are chiefly the result, rather than the cause, of the differences among the soils.

Climate

Climate helps to determine the kind of plant and animal life on and in the soil and the amount of water available for the weathering of minerals and the translocation of soil material. Through its influence on soil temperature, climate determines the rate of the chemical reactions that occur in the soil. These influences are significant, but they affect large areas rather than relatively small areas, such as a county.

The climate in Washington County is cool and humid. It is presumably, similar to the climate under which the soils formed. Although the climate is uniform throughout the county, its effect is modified locally by runoff and the proximity to large bodies of water. Only minor differences among the soils are the result of differences in climate. More detailed information about the climate is available under the heading "General Nature of the County."

Relief

Relief has markedly affected the soils in Washington County through its effect on natural drainage, erosion, plant cover, and soil temperature. Slopes range from 0 to more than 75 percent. Runoff is most rapid on the steeper slopes. Water is ponded in the lower areas.

Natural soil drainage in the county ranges from well drained on ridgetops to very poorly drained in the lower depressions. Through its effect on aeration of the soil, drainage determines the color of the soil. Water and air move freely through well drained soils but slowly through very poorly drained soils. In Crider and other well drained soils, the iron compounds that give most soils their color are brightly colored and oxidized. Zipp and other very poorly drained soils are dull gray and mottled.

Time

Usually, a long time is required for the processes of soil formation to form distinct soil horizons. Differences in the length of time that the parent material has been in place are commonly reflected in the degree of profile development. Some soils form rapidly. Others form slowly.

The soils in Washington County range from young to mature. The oldest soils are those that formed in limestone, sandstone, shale, or siltstone residuum on the smoother parts of the uplands. These soils have been

exposed to the soil-forming processes long enough for distinct genetic horizons to form.

Some soils have not been in place long enough for the development of distinct horizons. Wakeland and other young soils that formed in alluvial material are examples. Also, several of the steeper soils in the county are likely to be immature because geologic erosion removes the soil material about as rapidly as the material accumulates. Runoff is more rapid on these soils than on other soils. Consequently, less water percolates through the profile. The moderately deep Berks, Caneyville, and Gilpin soils and the shallow Weikert soils tend to remain relatively young because of their slope.

Processes of Soil Formation

Several processes have been involved in the formation of the soils in Washington County. These processes are the accumulation of organic matter; the dissolution, transfer, and removal of calcium carbonates and bases; the liberation and translocation of silicate clay minerals; and the reduction and transfer of iron. In most soils more than one of these processes have helped to differentiate horizons.

Some organic matter has accumulated in the surface layer of all the soils in the county. The organic matter content of some soils is low, but that of others is high. Generally, the soils that have the most organic matter, such as Montgomery soils, have a thick, dark surface soil.

Carbonates and bases have been leached from the upper horizons of nearly all the soils in the county. Leaching probably preceded the translocation of silicate clay minerals. Nearly all of the carbonates and some of the bases have been leached from the A and B horizons of well drained soils. Even in the wettest soils, some leaching is indicated by the absence of carbonates and by an acid reaction. Leaching of wet soils is slow because water moves slowly through soils that have a high water table.

Silicate clays accumulate in pores and on the faces of the structural units along which water moves. The leaching of bases and the translocation of silicate clays are among the more important processes of horizon differentiation in the county. Crider soils are an example of soils in which translocated silicate clays in the form of clay films have accumulated in the Bt and 2Bt horizons.

Gleying, or the reduction and transfer of iron, has occurred in all of the very poorly drained to somewhat poorly drained soils in the county. In the naturally wet soils, this process has significantly affected horizon differentiation. A gray color in the subsoil indicates the redistribution of iron oxide. Reduction is commonly accompanied by some transfer of the iron, either from upper horizons to lower ones or completely out of the profile. Mottles, which are in some horizons, indicate the segregation of iron.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of a standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing seaon, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically recieve high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water

is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainage system, subsurface. Removal of excess ground water through buried drains installed within the soil profile. The drains collect the water and convey it to a gravity or pump outlet.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated

by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the

greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series

because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-78 at Salem, Indiana)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	40.5	21.5	31.1	68	-10	9	3.43	1.81	4.84	7	6.1
February---	44.6	23.9	34.3	70	-8	16	3.13	1.12	4.79	7	4.5
March------	54.2	32.0	43.1	80	7	68	4.56	2.12	6.64	9	4.0
April------	67.5	43.0	55.3	85	23	188	4.06	2.22	5.67	9	.3
May--------	76.0	50.9	63.5	91	29	424	4.36	2.63	5.91	8	.0
June-------	84.6	60.0	72.3	96	42	669	3.99	2.23	5.55	7	.0
July-------	87.5	63.5	75.5	98	47	791	4.59	2.68	6.29	7	.0
August-----	86.5	61.2	73.8	97	47	738	3.05	2.01	3.99	6	.0
September--	81.3	54.8	68.1	96	34	543	2.87	1.17	4.29	5	.0
October----	69.8	43.1	56.5	88	23	227	2.52	1.16	3.69	5	.0
November---	54.8	33.7	44.3	78	9	22	3.19	1.67	4.52	6	2.0
December---	44.1	26.0	35.0	68	0	15	3.60	1.80	5.15	7	2.0
Yearly:											
Average--	66.0	42.8	54.4	---	---	---	---	---	---	---	---
Extreme--	---	---	---	100	-12	---	---	---	---	---	---
Total----	---	---	---	---	---	3,710	43.35	37.43	48.32	83	18.9

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-78 at Salem, Indiana)

Probability	Temperature		
	24^{o} F or lower	28^{o} F or lower	32^{o} F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 14	Apr. 28	May 14
2 years in 10 later than--	Apr. 9	Apr. 23	May 8
5 years in 10 later than--	Mar. 31	Apr. 13	Apr. 27
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 20	Oct. 8	Sept. 29
2 years in 10 earlier than--	Oct. 24	Oct. 13	Oct. 3
5 years in 10 earlier than--	Nov. 1	Oct. 21	Oct. 12

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-78 at Salem, Indiana)

Probability	Daily minimum temperature during growing season		
	Higher than 24^{o} F	Higher than 28^{o} F	Higher than 32^{o} F
	Days	Days	Days
9 years in 10	195	175	144
8 years in 10	201	180	152
5 years in 10	215	190	167
2 years in 10	228	201	181
1 year in 10	235	206	189

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AlB	Alvin fine sandy loam, 2 to 6 percent slopes	280	0.1
AvA	Avonburg silt loam, 0 to 2 percent slopes	210	0.1
Ba	Bartle silt loam	3,200	1.0
BdA	Bedford silt loam, 0 to 2 percent slopes	4,275	1.3
BdB	Bedford silt loam, 2 to 6 percent slopes	37,800	11.4
BdC2	Bedford silt loam, 6 to 12 percent slopes, eroded	3,050	0.9
BhF	Berks-Weikert complex, 25 to 75 percent slopes	29,950	9.1
BmC	Bloomfield loamy fine sand, 6 to 18 percent slopes	380	0.1
BmF	Bloomfield loamy fine sand, 18 to 40 percent slopes	440	0.1
Bo	Bonnie silt loam, frequently flooded	1,050	0.3
Br	Bromer silt loam	6,475	2.0
Bu	Burnside silt loam, occasionally flooded	4,700	1.4
CaE2	Caneyville-Hagerstown silt loams, 18 to 25 percent slopes, eroded	3,700	1.1
CdF	Caneyville-Rock outcrop complex, 25 to 50 percent slopes	5,500	1.7
CeD2	Chetwynd loam, 8 to 18 percent slopes, eroded	300	0.1
CeF	Chetwynd loam, 18 to 35 percent slopes	270	0.1
ChB	Cincinnati silt loam, 2 to 6 percent slopes	1,300	0.4
ChC2	Cincinnati silt loam, 6 to 12 percent slopes, eroded	2,200	0.7
CoB	Crider silt loam, 2 to 6 percent slopes	19,400	5.9
CoC2	Crider silt loam, 6 to 12 percent slopes, eroded	60,750	18.4
CoD2	Crider silt loam, 12 to 18 percent slopes, eroded	7,260	2.2
CrC3	Crider silty clay loam, 6 to 12 percent slopes, severely eroded	720	0.2
CrD3	Crider silty clay loam, 12 to 18 percent slopes, severely eroded	325	0.1
CsC2	Crider silt loam, karst, 4 to 12 percent slopes, eroded	15,800	4.8
CtD2	Crider-Frederick silt loams, karst, 12 to 22 percent slopes, eroded	7,285	2.2
Cu	Cuba silt loam, frequently flooded	5,800	1.8
Cw	Cuba silt loam, occasionally flooded	1,670	0.5
DbA	Dubois silt loam, 0 to 2 percent slopes	870	0.3
ElB	Elkinsville silt loam, 2 to 6 percent slopes	500	0.2
ElC2	Elkinsville silt loam, 6 to 12 percent slopes, eroded	260	0.1
FwD2	Frederick silt loam, karst, 12 to 22 percent slopes, eroded	1,070	0.3
FxC2	Frederick-Baxter Variant complex, karst, 4 to 12 percent slopes, eroded	980	0.3
GlD2	Gilpin silt loam, 12 to 18 percent slopes, eroded	2,550	0.8
GnF	Gilpin-Berks loams, 18 to 50 percent slopes	10,150	3.1
GpF	Gilpin-Berks-Ebal complex, 18 to 50 percent slopes	3,550	1.1
HaC2	Hagerstown silt loam, 6 to 12 percent slopes, eroded	1,650	0.5
HcC3	Hagerstown silty clay loam, 6 to 12 percent slopes, severely eroded	775	0.3
HeD2	Hagerstown-Caneyville silt loams, 12 to 18 percent slopes, eroded	13,000	3.9
HhB	Haubstadt silt loam, 2 to 6 percent slopes	725	0.2
Hm	Haymond silt loam, frequently flooded	12,050	3.6
HrD2	Hickory silt loam, 12 to 18 percent slopes, eroded	725	0.2
MaB	Markland silt loam, 2 to 8 percent slopes	475	0.1
MgA	McGary silt loam, 0 to 2 percent slopes	725	0.2
Mo	Montgomery silty clay loam	625	0.2
No	Nolin silt loam, frequently flooded	1,925	0.6
OtC2	Otwell silt loam, 6 to 12 percent slopes, eroded	625	0.2
PeA	Pekin silt loam, 0 to 2 percent slopes	475	0.1
PeB	Pekin silt loam, 2 to 6 percent slopes	5,050	1.5
PeC2	Pekin silt loam, 6 to 12 percent slopes, eroded	900	0.3
Pg	Peoga silt loam	450	0.1
Ph	Peoga silt loam, clayey substratum	1,725	0.5
Pt	Pits, quarries	150	*
RsB	Rossmoyne silt loam, 2 to 6 percent slopes	285	0.1
Sf	Stendal silt loam, frequently flooded	12,950	3.9
So	Stendal silt loam, occasionally flooded	1,575	0.5
Wa	Wakeland silt loam, frequently flooded	2,460	0.7
WeC2	Wellston silt loam, 6 to 12 percent slopes, eroded	8,000	2.4
WeD	Wellston silt loam, 12 to 18 percent slopes	7,500	2.3
ZaB	Zanesville silt loam, 1 to 6 percent slopes	3,125	0.9
ZaC2	Zanesville silt loam, 6 to 12 percent slopes, eroded	3,675	1.1
Zp	Zipp silty clay	2,375	0.7
	Water areas less than 40 acres in size	2,115	0.6
	Water areas more than 40 acres in size	494	0.1
	Total	330,624	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
AlB	Alvin fine sandy loam, 2 to 6 percent slopes
AvA	Avonburg silt loam, 0 to 2 percent slopes (where drained)
Ba	Bartle silt loam (where drained)
BdA	Bedford silt loam, 0 to 2 percent slopes
BdB	Bedford silt loam, 2 to 6 percent slopes
Bo	Bonnie silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
Br	Bromer silt loam (where drained)
Bu	Burnside silt loam, occasionally flooded
ChB	Cincinnati silt loam, 2 to 6 percent slopes
CoB	Crider silt loam, 2 to 6 percent slopes
Cu	Cuba silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
Cw	Cuba silt loam, occasionally flooded
DbA	Dubois silt loam, 0 to 2 percent slopes (where drained)
ElB	Elkinsville silt loam, 2 to 6 percent slopes
HhB	Haubstadt silt loam, 2 to 6 percent slopes
Hm	Haymond silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
MaB	Markland silt loam, 2 to 8 percent slopes
MgA	McGary silt loam, 0 to 2 percent slopes (where drained)
Mo	Montgomery silty clay loam (where drained)
No	Nolin silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
PeA	Pekin silt loam, 0 to 2 percent slopes
PeB	Pekin silt loam, 2 to 6 percent slopes
Pg	Peoga silt loam (where drained)
Ph	Peoga silt loam, clayey substratum (where drained)
RsB	Rossmoyne silt loam, 2 to 6 percent slopes
Sf	Stendal silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
So	Stendal silt loam, occasionally flooded (where drained)
Wa	Wakeland silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
ZaB	Zanesville silt loam, 1 to 6 percent slopes
Zp	Zipp silty clay (where drained)

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-red clover hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
AlB----------------------- Alvin	IIe	95	33	48	4.3	8.6
AvA----------------------- Avonburg	IIw	110	38	50	3.6	7.2
Ba------------------------ Bartle	IIw	110	38	50	3.6	7.2
BdA----------------------- Bedford	IIw	95	33	43	3.1	6.2
BdB----------------------- Bedford	IIe	95	33	43	3.1	6.2
BdC2---------------------- Bedford	IIIe	75	28	32	2.3	4.6
BhF----------------------- Berks-Weikert	VIIe	---	---	---	---	---
BmC----------------------- Bloomfield	IVe	73	29	38	2.9	5.8
BmF----------------------- Bloomfield	VIe	---	---	---	---	---
Bo------------------------ Bonnie	IIIw	125	37	46	4.0	8.0
Br------------------------ Bromer	IIw	110	38	45	3.6	7.2
Bu------------------------ Burnside	IIs	90	31	39	3.2	6.4
CaE2---------------------- Caneyville-Hagerstown	VIe	---	---	---	---	---
CdF**--------------------- Caneyville-Rock outcrop	VIIe	---	---	---	---	---
CeD2---------------------- Chetwynd	IVe	80	28	36	2.6	5.2
CeF----------------------- Chetwynd	VIe	---	---	---	---	4.0
ChB----------------------- Cincinnati	IIe	110	35	50	4.5	9.0
ChC2---------------------- Cincinnati	IIIe	105	30	40	4.5	9.0
CoB----------------------- Crider	IIe	120	42	50	5.5	9.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-red clover hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
CoC2---------------------- Crider	IIIe	100	40	46	5.0	9.0
CoD2---------------------- Crider	IVe	85	30	34	4.0	8.0
CrC3---------------------- Crider	IVe	85	30	34	4.5	8.5
CrD3---------------------- Crider	VIe	---	---	---	3.5	7.0
CsC2---------------------- Crider	IIIe	95	35	38	4.5	9.0
CtD2---------------------- Crider-Frederick	IVe	93	32	36	3.7	7.4
Cu------------------------ Cuba	IIw	105	37	---	3.5	8.0
Cw------------------------ Cuba	IIw	105	37	---	3.5	8.0
DbA----------------------- Dubois	IIw	110	38	45	3.6	7.2
ElB----------------------- Elkinsville	IIe	120	42	48	4.0	8.0
ElC2---------------------- Elkinsville	IIIe	105	37	42	3.4	6.8
FwD2---------------------- Frederick	IVe	110	38	45	3.0	6.0
FxC2---------------------- Frederick-Baxter Variant	IIIe	110	38	45	3.2	6.4
GlD2---------------------- Gilpin	IVe	80	28	32	2.5	5.0
GnF----------------------- Gilpin-Berks	VIIe	---	---	---	---	---
GpF----------------------- Gilpin-Berks-Ebal	VIIe	---	---	---	---	---
HaC2---------------------- Hagerstown	IIIe	110	25	45	5.0	9.0
HcC3---------------------- Hagerstown	IVe	100	32	35	4.0	8.0
HeD2---------------------- Hagerstown-Caneyville	IVe	70	26	30	3.0	6.0
HhB----------------------- Haubstadt	IIe	110	35	40	4.5	9.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-red clover hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
Hm------------------------ Haymond	IIw	110	39	42	3.7	8.0
HrD2---------------------- Hickory	IVe	67	24	30	2.5	5.0
MaB----------------------- Markland	IIIe	80	28	36	2.6	5.2
MgA----------------------- McGary	IIIw	100	35	45	3.3	6.6
Mo------------------------ Montgomery	IIIw	120	42	48	4.0	8.0
No------------------------ Nolin	IIw	85	32	---	4.0	8.0
OtC2---------------------- Otwell	IIIe	85	30	38	2.8	5.6
PeA----------------------- Pekin	IIs	105	37	47	3.4	6.8
PeB----------------------- Pekin	IIe	105	37	47	3.4	6.8
PeC2---------------------- Pekin	IIIe	85	30	38	2.8	5.6
Pg------------------------ Peoga	IIIw	125	44	50	4.1	8.2
Ph------------------------ Peoga	IIIw	120	42	48	4.0	8.0
Pt**. Pits						
RsB----------------------- Rossmoyne	IIe	110	35	40	4.5	9.0
Sf------------------------ Stendal	IIw	110	38	---	3.7	7.4
So------------------------ Stendal	IIw	120	40	40	3.7	7.4
Wa------------------------ Wakeland	IIw	115	40	---	4.4	8.8
WeC2---------------------- Wellston	IIIe	95	33	35	3.8	7.6
WeD----------------------- Wellston	IVe	95	---	35	3.5	7.0
ZaB----------------------- Zanesville	IIe	90	32	40	3.5	7.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-red clover hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
ZaC2 Zanesville	IIIe	75	30	38	3.5	7.0
Zp Zipp	IIIw	105	37	42	3.4	6.8

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	---	---	---	---	---
II	127,100	68,465	53,460	5,175	---
III	105,315	98,365	6,950	---	---
IV	41,565	41,565	---	---	---
V	---	---	---	---	---
VI	4,735	4,735	---	---	---
VII	49,150	49,150	---	---	---
VIII	---	---	---	---	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
AlB------------- Alvin	4A	Slight	Slight	Slight	Slight	White oak-----------	80	62	Green ash, black walnut, yellow-poplar, white oak, eastern white pine, American sycamore, sugar maple.
						Northern red oak----	80	62	
						Black walnut--------	---	---	
						Yellow-poplar-------	90	90	
AvA------------- Avonburg	4D	Slight	Slight	Moderate	Moderate	White oak-----------	70	52	Eastern white pine, baldcypress, white ash, red maple, yellow-poplar, American sycamore.
						Northern red oak----	75	57	
						Pin oak-------------	85	67	
						Yellow-poplar-------	85	81	
						Sweetgum------------	80	79	
Ba-------------- Bartle	4A	Slight	Slight	Slight	Slight	White oak-----------	75	57	Eastern white pine, baldcypress, white ash, red maple, yellow-poplar, American sycamore.
						Pin oak-------------	85	67	
						Yellow-poplar-------	85	81	
						Sweetgum------------	80	79	
BdA, BdB, BdC2-- Bedford	4A	Slight	Slight	Slight	Slight	White oak-----------	70	52	Eastern white pine, red pine, yellow-poplar, white ash.
						Northern red oak----	75	57	
						Yellow-poplar-------	90	90	
						Virginia pine-------	75	115	
						Sugar maple---------	75	47	
BhF**:									
Berks-----------	4R	Moderate	Severe	Moderate	Slight	Northern red oak----	70	52	Virginia pine, eastern white pine, red pine.
						Black oak-----------	70	52	
						Virginia pine-------	70	109	
Weikert---------	3R	Moderate	Severe	Severe	Moderate	Northern red oak----	64	47	Eastern white pine, shortleaf pine, Virginia pine.
						Virginia pine-------	60	91	
BmC------------- Bloomfield	4S	Slight	Slight	Moderate	Slight	Black oak-----------	70	52	Eastern white pine, red pine, jack pine.
						White oak-----------	---	---	
						Scarlet oak---------	---	---	
						Shagbark hickory----	---	---	
BmF------------- Bloomfield	4R	Moderate	Moderate	Moderate	Slight	Black oak-----------	70	52	Eastern white pine, red pine, jack pine.
						White oak-----------	---	---	
						Scarlet oak---------	---	---	
						Shagbark hickory----	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
Bo-------------- Bonnie	5W	Slight	Severe	Severe	Severe	Pin oak------------ Eastern cottonwood-- Sweetgum------------ Cherrybark oak------ American sycamore---	90 100 --- --- ---	72 128 --- --- ---	Eastern cottonwood, red maple, American sycamore, sweetgum, baldcypress, pin oak.
Br-------------- Bromer	4W	Slight	Moderate	Moderate	Slight	White oak---------- Pin oak------------ Yellow-poplar------- Sweetgum-----------	75 85 85 80	57 67 81 79	Eastern white pine, baldcypress, white ash, red maple, yellow-poplar, American sycamore.
Bu-------------- Burnside	7A	Slight	Slight	Slight	Slight	Yellow-poplar------- Eastern cottonwood-- American sycamore--- Cherrybark oak------ Sweetgum----------- Southern red oak----	95 105 --- --- --- ---	98 141 --- --- --- ---	Black walnut, American sycamore, eastern cottonwood, pin oak, red maple.
CaE2**: Caneyville-----	4C	Severe	Moderate	Slight	Slight	Black oak---------- White oak---------- Sugar maple--------- Hickory------------ White ash---------- Eastern redcedar---- Yellow-poplar-------	71 64 --- --- 72 46 90	53 47 --- --- 69 --- 90	White oak, yellow-poplar, white ash, eastern white pine.
Hagerstown-----	4R	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	85 95	67 98	Eastern white pine, yellow-poplar, black walnut.
CdF**: Caneyville-----	4R	Severe	Severe	Slight	Slight	Black oak---------- White oak---------- Sugar maple--------- Hickory------------ White ash---------- Eastern redcedar---- Yellow-poplar-------	71 64 --- --- 72 46 90	53 47 --- --- 69 --- 90	White oak, yellow-poplar, white ash, eastern white pine.
Rock outcrop.									
CeD2----------- Chetwynd	7A	Slight	Slight	Slight	Slight	Yellow-poplar------- Northern red oak----	99 88	105 70	Eastern white pine, black walnut, yellow-poplar, red pine.
CeF------------ Chetwynd	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar------- Northern red oak----	99 88	105 70	Eastern white pine, black walnut, yellow-poplar, red pine.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
ChB, ChC2: Cincinnati	4A	Slight	Slight	Slight	Slight	Northern red oak	80	62	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, northern red oak, white oak.
						White oak	---	---	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
						Yellow-poplar	---	---	
CoB, CoC2: Crider	7A	Slight	Slight	Slight	Slight	Yellow-poplar	98	104	Eastern white pine, yellow-poplar, black walnut, white ash, northern red oak, white oak.
						Sugar maple	---	---	
						Black oak	87	69	
						White ash	---	---	
						Virginia pine	77	118	
						Black walnut	---	---	
						White oak	---	---	
						Hickory	---	---	
						Eastern redcedar	---	---	
						Black cherry	---	---	
CoD2: Crider	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar	98	104	Eastern white pine, yellow-poplar, black walnut, white ash, northern red oak, white oak.
						Sugar maple	---	---	
						Black oak	87	69	
						White ash	---	---	
						Virginia pine	77	118	
						Black walnut	---	---	
						White oak	---	---	
						Hickory	---	---	
						Eastern redcedar	---	---	
						Black cherry	---	---	
CrC3: Crider	7A	Slight	Slight	Slight	Slight	Yellow-poplar	98	104	Eastern white pine, yellow-poplar, black walnut, white ash, northern red oak, white oak.
						Sugar maple	---	---	
						Black oak	87	69	
						White ash	---	---	
						Virginia pine	77	118	
						Black walnut	---	---	
						White oak	---	---	
						Hickory	---	---	
						Eastern redcedar	---	---	
						Black cherry	---	---	
CrD3: Crider	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar	98	104	Eastern white pine, yellow-poplar, black walnut, white ash, northern red oak, white oak.
						Sugar maple	---	---	
						Black oak	87	69	
						White ash	---	---	
						Virginia pine	77	118	
						Black walnut	---	---	
						White oak	---	---	
						Hickory	---	---	
						Eastern redcedar	---	---	
						Black cherry	---	---	
CsC2: Crider	7A	Slight	Slight	Slight	Slight	Yellow-poplar	98	104	Eastern white pine, yellow-poplar, black walnut, white ash, northern red oak, white oak.
						Sugar maple	---	---	
						Black oak	87	69	
						White ash	---	---	
						Virginia pine	77	118	
						Black walnut	---	---	
						White oak	---	---	
						Hickory	---	---	
						Eastern redcedar	---	---	
						Black cherry	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
CtD2**:									
Crider	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar	98	104	Eastern white pine, yellow-poplar, black walnut, white ash, northern red oak, white oak.
						Sugar maple	---	---	
						Black oak	87	69	
						White ash	---	---	
						Virginia pine	77	118	
						Black walnut	---	---	
						White oak	---	---	
						Hickory	---	---	
						Eastern redcedar	---	---	
						Black cherry	---	---	
Frederick	4R	Moderate	Moderate	Slight	Slight	Northern red oak	76	58	Eastern white pine, yellow-poplar.
						Yellow-poplar	86	82	
						White oak	---	---	
						Black walnut	---	---	
Cu, Cw Cuba	8A	Slight	Slight	Slight	Slight	Yellow-poplar	100	107	Eastern white pine, black walnut, yellow-poplar.
DbA Dubois	3A	Slight	Slight	Slight	Slight	White oak	65	48	Eastern white pine, green ash, white ash, northern red oak, yellow-poplar, American sycamore.
						Pin oak	---	---	
						Yellow-poplar	---	---	
						Sweetgum	---	---	
						Northern red oak	---	---	
ElB, ElC2 Elkinsville	5A	Slight	Slight	Slight	Slight	White oak	90	72	Eastern white pine, red pine, white ash, yellow-poplar, black walnut, black locust.
						Yellow-poplar	98	104	
						Sweetgum	76	70	
FwD2 Frederick	4R	Moderate	Moderate	Slight	Slight	Northern red oak	76	58	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar	86	82	
						White oak	76	58	
						Black walnut	76	---	
FxC2**:									
Frederick	4C	Slight	Moderate	Slight	Slight	Northern red oak	76	58	Eastern white pine, yellow-poplar, black walnut.
						Yellow-poplar	86	82	
						White oak	76	58	
						Black walnut	76	---	
Baxter Variant	5A	Slight	Slight	Slight	Slight	Northern red oak	93	75	White oak, yellow-poplar, northern red oak, white ash, green ash, red pine, black cherry, American sycamore, eastern cottonwood, black walnut.
						Yellow-poplar	89	88	
						Shortleaf pine	80	130	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
GlD2----------- Gilpin	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 95	62 98	Virginia pine, eastern white pine, black cherry, yellow-poplar.
GnF**:									
Gilpin---------	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 95	62 98	Virginia pine, eastern white pine, black cherry, yellow-poplar.
Berks----------	4F	Slight	Moderate	Moderate	Slight	Northern red oak---- Black oak----------- Virginia pine-------	70 70 70	52 52 109	Virginia pine, eastern white pine, red pine.
GpF**:									
Gilpin---------	4R	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 95	62 98	Virginia pine, eastern white pine, black cherry, yellow-poplar.
Berks----------	4F	Slight	Moderate	Moderate	Slight	Northern red oak---- Black oak----------- Virginia pine-------	70 70 70	52 52 109	Virginia pine, eastern white pine, red pine.
Ebal-----------	4R	Moderate	Moderate	Moderate	Moderate	Black oak----------- Northern red oak---- Yellow-poplar-------	80 --- ---	62 --- ---	Yellow-poplar, eastern cottonwood, pin oak, green ash, red maple, black oak.
HaC2, HcC3------ Hagerstown	4S	Slight	Moderate	Slight	Slight	White oak----------- Sweetgum------------ Virginia pine-------	70 80 70	52 79 109	Virginia pine, eastern white pine, sweetgum.
HeD2**:									
Hagerstown-----	4S	Moderate	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	85 95	67 98	Eastern white pine, yellow-poplar, black walnut.
Caneyville-----	6R	Severe	Severe	Slight	Slight	Yellow-poplar------- Black oak-----------	90 80	90 62	Yellow-poplar, black walnut, Virginia pine.
HhB------------- Haubstadt	4D	Slight	Slight	Slight	Moderate	Northern red oak---- White oak----------- White ash----------- Slippery elm-------- American beech------ Sugar maple--------- American sycamore---	80 --- --- --- --- --- ---	62 --- --- --- --- --- ---	Eastern white pine, red pine, Virginia pine, white ash, yellow-poplar, black oak.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
Hm------------- Haymond	8A	Slight	Slight	Slight	Slight	Yellow-poplar-------	100	107	Eastern white pine, black walnut, yellow-poplar.
						White oak-----------	90	72	
						Black walnut--------	70	---	
HrD2----------- Hickory	5R	Moderate	Moderate	Slight	Slight	White oak-----------	85	67	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
						Northern red oak----	85	67	
						Black oak-----------	---	---	
						Green ash-----------	---	---	
						Bitternut hickory---	---	---	
						Yellow-poplar-------	95	98	
MaB------------ Markland	4C	Slight	Slight	Severe	Severe	White oak-----------	75	57	Eastern white pine, red pine, yellow-poplar, white ash.
						Northern red oak----	78	60	
MgA------------ McGary	4W	Slight	Moderate	Severe	Severe	White oak-----------	70	52	Eastern white pine, baldcypress, white ash, red maple, yellow-poplar, American sycamore, eastern cottonwood, green ash.
						Pin oak-------------	85	67	
						Yellow-poplar-------	85	81	
						Sweetgum------------	80	79	
Mo------------- Montgomery	5W	Slight	Severe	Severe	Severe	Pin oak-------------	88	70	American sycamore, pin oak, green ash, red maple, eastern cottonwood, silver maple.
						White oak-----------	75	57	
						Sweetgum------------	90	106	
No------------- Nolin	8W	Slight	Moderate	Slight	Slight	Sweetgum------------	92	112	Sweetgum.
						Cherrybark oak------	97	79	
						Eastern cottonwood--	---	---	
						River birch---------	---	---	
						Black willow--------	---	---	
						American sycamore---	---	---	
OtC2----------- Otwell	3D	Slight	Slight	Moderate	Moderate	White oak-----------	65	48	Eastern white pine, red pine, yellow-poplar, white ash.
						Yellow-poplar-------	---	---	
						Sugar maple---------	---	---	
PeA, PeB, PeC2-- Pekin	4A	Slight	Slight	Slight	Slight	White oak-----------	70	52	Eastern white pine, red pine, yellow-poplar, white ash.
						Yellow-poplar-------	85	81	
						Virginia pine-------	75	115	
						Sugar maple---------	75	47	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
Pg, Ph: Peoga	5W	Slight	Severe	Severe	Moderate	Pin oak	90	72	Eastern white pine, baldcypress, green ash, red maple, white ash, sweetgum, pin oak.
						White oak	75	57	
						Sweetgum	90	106	
RsB: Rossmoyne	3D	Slight	Slight	Moderate	Moderate	White oak	61	44	White ash, Virginia pine, yellow-poplar, eastern white pine, black oak.
						White ash	---	---	
						Northern red oak	80	62	
						Sugar maple	---	---	
						Slippery elm	---	---	
						American beech	---	---	
						American sycamore	---	---	
Sf, So: Stendal	5W	Slight	Moderate	Slight	Slight	Pin oak	90	72	Eastern white pine, baldcypress, American sycamore, red maple, white ash.
						Sweetgum	85	93	
						Yellow-poplar	90	90	
						Virginia pine	90	135	
Wa: Wakeland	5A	Slight	Slight	Slight	Slight	Pin oak	90	72	Eastern white pine, baldcypress, American sycamore, red maple, white ash.
						Sweetgum	88	101	
						Yellow-poplar	90	96	
						Virginia pine	85	129	
WeC2: Wellston	4A	Slight	Slight	Slight	Slight	Northern red oak	71	53	Eastern white pine, black walnut, yellow-poplar, white oak, northern red oak, white ash, red pine, green ash, black cherry.
						Yellow-poplar	90	90	
						Virginia pine	70	109	
						White oak	---	---	
						Black walnut	---	---	
						Black cherry	---	---	
						Sugar maple	---	---	
						White ash	---	---	
WeD: Wellston	4R	Moderate	Moderate	Slight	Slight	Northern red oak	71	53	Eastern white pine, black walnut, yellow-poplar, white oak, northern red oak, white ash, red pine, green ash, black cherry.
						Yellow-poplar	90	90	
						Virginia pine	70	109	
						White oak	---	---	
ZaB, ZaC2: Zanesville	7A	Slight	Slight	Slight	Slight	Virginia pine	66	102	Yellow-poplar, white ash, white oak, northern red oak, eastern white pine.
						Black oak	75	57	
						White oak	69	51	
						Hickory	---	---	
						Yellow-poplar	90	90	
						Shortleaf pine	63	95	
						Sweetgum	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
Zp Zipp	5W	Slight	Severe	Severe	Severe	Pin oak White oak Sweetgum	88 75 90	70 57 106	Eastern white pine, baldcypress, red maple, white ash, sweetgum.

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
AlB: Alvin	---	Amur privet, Washington hawthorn, Amur honeysuckle, American cranberrybush, Tatarian honeysuckle.	Austrian pine, northern white-cedar, osageorange, eastern redcedar.	Eastern white pine, red pine, Norway spruce.	---
AvA: Avonburg	---	Arrowwood, eastern redcedar, Washington hawthorn, Amur honeysuckle, American cranberrybush, Amur privet, Tatarian honeysuckle.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Ba: Bartle	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
BdA, BdB, BdC2: Bedford	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
BhF*:					
Berks	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Weikert	---	Blackhaw, staghorn sumac, forsythia, autumn-olive.	Jack pine, Austrian pine.	Virginia pine, red pine.	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
BmC, BmF----------Bloomfield	Siberian peashrub	Radiant crabapple, eastern redcedar, autumn-olive, Washington hawthorn, Amur honeysuckle, lilac, Tatarian honeysuckle.	Austrian pine, jack pine, red pine.	Eastern white pine	---
Bo----------------Bonnie	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	White fir, blue spruce, Washington hawthorn, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
Br----------------Bromer	---	Amur honeysuckle, American cranberrybush, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
Bu----------------Burnside	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
CaE2*:					
Caneyville--------	Siberian peashrub	Tatarian honeysuckle, lilac, Amur honeysuckle, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Austrian pine, jack pine, red pine.	Eastern white pine	---
Hagerstown--------	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	White fir, blue spruce, Washington hawthorn, northern white-cedar, Austrian pine.	Norway spruce-----	Eastern white pine, pin oak.
CdF*:					
Caneyville--------	Siberian peashrub	Tatarian honeysuckle, lilac, Amur honeysuckle, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Austrian pine, jack pine, red pine.	Eastern white pine	---
Rock outcrop.					

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
CeD2, CeF--------- Chetwynd	---	Amur honeysuckle, American cranberrybush, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
ChB, ChC2--------- Cincinnati	---	Eastern redcedar, Washington hawthorn, Tatarian honeysuckle, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Austrian pine, osageorange.	Pin oak, eastern white pine.	---
CoB, CoC2, CoD2, CrC3, CrD3, CsC2- Crider	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
CtD2*:					
Crider-----------	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
Frederick--------	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Cu, Cw------------ Cuba	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
DbA--------------- Dubois	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
ElB, ElC2--------- Elkinsville	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
FwD2: Frederick	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, eastern white pine.	---	---
FxC2*:					
Frederick	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, eastern white pine.	---	---
Baxter Variant	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
GlD2: Gilpin	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
GnF*:					
Gilpin	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Berks	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
GpF*:					
Gilpin	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Berks	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Ebal	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
HaC2, HcC3 Hagerstown	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine.
HeD2*:					
Hagerstown	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine.
Caneyville	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
HhB Haubstadt	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
Hm: Haymond	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
HrD2: Hickory	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
MaB: Markland	---	Arrowwood, Washington hawthorn, eastern redcedar, Amur honeysuckle, American cranberrybush, Tatarian honeysuckle, Amur privet.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
MgA: McGary	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Mo: Montgomery	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Northern white-cedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
No: Nolin	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
OtC2: Otwell	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
PeA, PeB, PeC2: Pekin	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Pg: Peoga	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Northern white-cedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Ph: Peoga	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
Pt*. Pits					
RsB: Rossmoyne	---	Washington hawthorn, Amur honeysuckle, Amur privet, Tatarian honeysuckle, eastern redcedar, arrowwood, American cranberrybush.	Austrian pine, osageorange, green ash.	Pin oak, eastern white pine.	---
Sf, So: Stendal	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Northern white-cedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Wa: Wakeland	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush, silky dogwood.	Northern white-cedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	---	Eastern white pine, pin oak.
WeC2, WeD: Wellston	---	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	White fir, northern white-cedar, blue spruce, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
ZaB, ZaC2--------- Zanesville	---	American cranberrybush, Amur honeysuckle, Tatarian honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, osageorange, Austrian pine.	Pin oak, eastern white pine.	---
Zp---------------- Zipp	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Northern white-cedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AlB Alvin	Slight	Slight	Moderate: slope.	Slight	Slight.
AvA Avonburg	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Ba Bartle	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
BdA, BdB Bedford	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Moderate: wetness.
BdC2 Bedford	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.
BhF*:					
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Weikert	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, thin layer, small stones.
BmC Bloomfield	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
BmF Bloomfield	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bo Bonnie	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
Br Bromer	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Bu Burnside	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: large stones, flooding.
CaE2*:					
Caneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CdF*:					
Caneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CdF*: Rock outcrop.					
CeD2: Chetwynd	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
CeF: Chetwynd	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ChB: Cincinnati	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
ChC2: Cincinnati	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
CoB: Crider	Slight	Slight	Moderate: slope.	Slight	Slight.
CoC2: Crider	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
CoD2: Crider	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CrC3: Crider	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
CrD3: Crider	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CsC2: Crider	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
CtD2*: Crider	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Cu: Cuba	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Cw: Cuba	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
DbA: Dubois	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
ElB: Elkinsville	Slight	Slight	Moderate: slope.	Slight	Slight.
ElC2: Elkinsville	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
FwD2: Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FxC2*:					
Frederick	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Baxter Variant	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones.
GlD2 Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
GnF*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GpF*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ebal	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Severe: slope.
HaC2, HcC3 Hagerstown	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
HeD2*:					
Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Caneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
HhB Haubstadt	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Hm Haymond	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
HrD2 Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
MaB Markland	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
MgA McGary	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Mo Montgomery	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
No: Nolin	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
OtC2: Otwell	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: slope.
PeA, PeB: Pekin	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Slight.
PeC2: Pekin	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: slope.
Pg, Ph: Peoga	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pt*. Pits					
RsB: Rossmoyne	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Sf: Stendal	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: flooding, wetness.	Severe: flooding.
So: Stendal	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
Wa: Wakeland	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: flooding, wetness.	Severe: flooding.
WeC2: Wellston	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
WeD: Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
ZaB: Zanesville	Moderate: percs slowly, wetness.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
ZaC2: Zanesville	Moderate: slope, percs slowly, wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Zp: Zipp	Severe: ponding, percs slowly, too clayey.	Severe: ponding, too clayey, percs slowly.	Severe: too clayey, ponding, percs slowly.	Severe: ponding, too clayey.	Severe: ponding, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AlB Alvin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AvA Avonburg	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ba Bartle	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
BdA Bedford	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BdB Bedford	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BdC2 Bedford	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BhF*:										
Berks	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Weikert	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
BmC, BmF Bloomfield	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Bo Bonnie	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Br Bromer	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Bu Burnside	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
CaE2*:										
Caneyville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hagerstown	Fair	Fair	Good	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
CdF*:										
Caneyville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop.										
CeD2 Chetwynd	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CeF Chetwynd	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
ChB Cincinnati	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ChC2 Cincinnati	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CoB Crider	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CoC2 Crider	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CoD2 Crider	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CrC3 Crider	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CrD3 Crider	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CsC2 Crider	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CtD2*:										
Crider	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Frederick	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Cu Cuba	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
Cw Cuba	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
DbA Dubois	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
ElB Elkinsville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ElC2 Elkinsville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FwD2 Frederick	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FxC2*:										
Frederick	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Baxter Variant	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GlD2 Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
GnF*:										
Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Berks	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
GpF*:										
Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Berks	Very poor.	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Ebal	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HaC2, HcC3 Hagerstown	Fair	Fair	Good	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
HeD2*:										
Hagerstown	Fair	Fair	Good	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
Caneyville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HhB Haubstadt	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Hm Haymond	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
HrD2 Hickory	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MaB Markland	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MgA McGary	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Mo Montgomery	Fair	Poor	Poor	Good	Poor	Good	Good	Poor	Poor	Good.
No Nolin	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Fair	Very poor.
OtC2 Otwell	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
PeA Pekin	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
PeB Pekin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PeC2 Pekin	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Pg, Ph Peoga	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Pt*. Pits										
RsB Rossmoyne	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Sf Stendal	Fair	Fair	Fair	Good	Good	Good	Fair	Fair	Good	Fair.
So Stendal	Fair	Good	Fair	Good	Good	Good	Fair	Fair	Good	Fair.
Wa Wakeland	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
WeC2 Wellston	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WeD Wellston	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
ZaB Zanesville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ZaC2 Zanesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Zp Zipp	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AlB---------------- Alvin	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
AvA---------------- Avonburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Ba----------------- Bartle	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
BdA---------------- Bedford	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Moderate: wetness.
BdB---------------- Bedford	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.
BdC2--------------- Bedford	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: wetness, slope.
BhF*:						
Berks-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Weikert-----------	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, thin layer, small stones.
BmC---------------- Bloomfield	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
BmF---------------- Bloomfield	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bo----------------- Bonnie	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
Br----------------- Bromer	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Bu----------------- Burnside	Moderate: depth to rock, large stones, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: large stones, flooding.

See footnote at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CaE2*:						
Caneyville	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
CdF*:						
Caneyville	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Rock outcrop.						
CeD2 Chetwynd	Severe: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, frost action, shrink-swell.	Moderate: slope.
CeF Chetwynd	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ChB Cincinnati	Moderate: dense layer, wetness.	Slight	Moderate: wetness.	Moderate: slope.	Severe: low strength, frost action.	Slight.
ChC2 Cincinnati	Moderate: dense layer, wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
CoB Crider	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
CoC2 Crider	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
CoD2 Crider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
CrC3 Crider	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
CrD3 Crider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
CsC2 Crider	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
CtD2*:						
Crider	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

See footnote at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CtD2*:						
Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Cu: Cuba	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Severe: flooding.
Cw: Cuba	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Moderate: flooding.
DbA: Dubois	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
ElB: Elkinsville	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
ElC2: Elkinsville	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
FwD2: Frederick	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
FxC2*:						
Frederick	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength.	Moderate: slope.
Baxter Variant	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, shrink-swell.	Severe: small stones.
GlD2: Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GnF*:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GpF*:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ebal	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.

See footnote at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HaC2, HcC3-------- Hagerstown	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
HeD2*:						
Hagerstown-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Caneyville-------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
HhB--------------- Haubstadt	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Moderate: wetness.
Hm---------------- Haymond	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Severe: flooding.
HrD2-------------- Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
MaB--------------- Markland	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
MgA--------------- McGary	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness.
Mo---------------- Montgomery	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: ponding.
No---------------- Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
OtC2-------------- Otwell	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
PeA--------------- Pekin	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength, frost action.	Slight.
PeB--------------- Pekin	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength, frost action.	Slight.
PeC2-------------- Pekin	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.

See footnote at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Pg, Ph------------ Peoga	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
Pt*. Pits						
RsB--------------- Rossmoyne	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.
Sf---------------- Stendal	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
So---------------- Stendal	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Moderate: wetness, flooding.
Wa---------------- Wakeland	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
WeC2-------------- Wellston	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Severe: frost action.	Moderate: slope.
WeD--------------- Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
ZaB--------------- Zanesville	Moderate: depth to rock, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: low strength.	Slight.
ZaC2-------------- Zanesville	Moderate: slope, wetness, depth to rock.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
Zp---------------- Zipp	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "poor," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AlB: Alvin	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
AvA: Avonburg	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ba: Bartle	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
BdA, BdB: Bedford	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, thin layer.
BdC2: Bedford	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Fair: too clayey, thin layer.
BhF*:					
Berks	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, depth to rock.
Weikert	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, depth to rock.
BmC: Bloomfield	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
BmF: Bloomfield	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Bo: Bonnie	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
Br: Bromer	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Bu: Burnside	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, depth to rock, wetness.	Severe: flooding, wetness.	Poor: small stones.

See footnote at end of table.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CaE2*:					
Caneyville	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Hagerstown	Severe: slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
CdF*:					
Caneyville	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Rock outcrop.					
CeD2 Chetwynd	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope, too clayey, thin layer.
CeF Chetwynd	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
ChB Cincinnati	Severe: wetness, percs slowly.	Moderate: slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, thin layer, wetness.
ChC2 Cincinnati	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
CoB Crider	Slight	Moderate: seepage, slope.	Severe: too clayey.	Slight	Fair: too clayey, thin layer.
CoC2 Crider	Moderate: slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Fair: too clayey, thin layer, slope.
CoD2 Crider	Severe: slope.	Severe: slope.	Severe: slope, too clayey	Severe: slope.	Poor: slope.
CrC3 Crider	Moderate: slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Fair: too clayey, thin layer, slope.
CrD3 Crider	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope.
CsC2 Crider	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, thin layer, slope.

See footnote at end of table.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CtD2*:					
Crider	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope.
Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Cu, Cw Cuba	Severe: flooding.	Severe: flooding.	Severe: flooding, too sandy.	Severe: flooding.	Poor: too sandy.
DbA Dubois	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
ElB Elkinsville	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, thin layer.
ElC2 Elkinsville	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, thin layer, slope.
FwD2 Frederick	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
FxC2*:					
Frederick	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Baxter Variant	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
GlD2 Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, depth to rock, thin layer.
GnF*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, depth to rock, thin layer.
Berks	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, depth to rock.
GpF*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, depth to rock, thin layer.

See footnote at end of table.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GpF*:					
Berks	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, depth to rock.
Ebal	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
HaC2, HcC3 Hagerstown	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
HeD2*:					
Hagerstown	Severe: slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Caneyville	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
HhB Haubstadt	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness, thin layer.
Hm Haymond	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
HrD2 Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
MaB Markland	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
MgA McGary	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Mo Montgomery	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
No Nolin	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, thin layer.
OtC2 Otwell	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.

See footnote at end of table.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PeA, PeB: Pekin	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness, thin layer.
PeC2: Pekin	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, slope, wetness.
Pg: Peoga	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ph: Peoga	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness, thin layer.
Pt*. Pits					
RsB: Rossmoyne	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
Sf, So: Stendal	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Wa: Wakeland	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
WeC2: Wellston	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: depth to rock, too clayey, slope.
WeD: Wellston	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
ZaB: Zanesville	Severe: percs slowly, wetness.	Severe: wetness.	Severe: depth to rock.	Moderate: depth to rock, wetness.	Fair: too clayey, thin layer.
ZaC2: Zanesville	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: depth to rock.	Moderate: depth to rock, slope, wetness.	Fair: slope, too clayey, thin layer.
Zp: Zipp	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AlB------------------ Alvin	Good-----------------	Probable-------------	Improbable: too sandy.	Good.
AvA------------------ Avonburg	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
Ba------------------- Bartle	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
BdA, BdB------------- Bedford	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
BdC2----------------- Bedford	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
BhF*:				
Berks----------------	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Weikert--------------	Poor: slope, depth to rock.	Improbable: small stones.	Improbable: thin layer.	Poor: slope, small stones, area reclaim.
BmC------------------ Bloomfield	Good-----------------	Probable-------------	Improbable: too sandy.	Fair: too sandy, slope.
BmF------------------ Bloomfield	Poor: slope.	Probable-------------	Improbable: too sandy.	Poor: slope.
Bo------------------- Bonnie	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Br------------------- Bromer	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Bu------------------- Burnside	Fair: depth to rock, thin layer, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, area reclaim.
CaE2*:				
Caneyville-----------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Hagerstown-----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CdF*:				
Caneyville	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Rock outcrop.				
CeD2 Chetwynd	Moderate: slope.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
CeF Chetwynd	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
ChB Cincinnati	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
ChC2 Cincinnati	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
CoB Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
CoC2 Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
CoD2 Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
CrC3 Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
CrD3 Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
CsC2 Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
CtD2*:				
Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, thin layer.
Cu, Cw Cuba	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
DbA Dubois	Fair: wetness, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ElB------------------- Elkinsville	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
ElC2------------------ Elkinsville	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
FwD2------------------ Frederick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, thin layer.
FxC2*:				
Frederick------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Baxter Variant-------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
GlD2------------------ Gilpin	Poor: thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
GnF*:				
Gilpin---------------	Poor: thin layer, slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Berks----------------	Poor: slope, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
GpF*:				
Gilpin---------------	Poor: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Berks----------------	Poor: slope, thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Ebal-----------------	Poor: low strength, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
HaC2, HcC3------------ Hagerstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, too clayey.
HeD2*:				
Hagerstown-----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope, too clayey.
Caneyville-----------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HhB: Haubstadt	Fair: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Hm: Haymond	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
HrD2: Hickory	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
MaB: Markland	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, too clayey.
MgA: McGary	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Mo: Montgomery	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
No: Nolin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
OtC2: Otwell	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
PeA, PeB: Pekin	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
PeC2: Pekin	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Pg: Peoga	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Ph: Peoga	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, wetness.
Pt*. Pits				
RsB: Rossmoyne	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim.
Sf, So: Stendal	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Wa: Wakeland	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
WeC2: Wellston	Fair: depth to rock, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WeD------------------- Wellston	Fair: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
ZaB, ZaC2------------- Zanesville	Severe: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Zp-------------------- Zipp	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
AlB: Alvin	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Soil blowing	Favorable.
AvA: Avonburg	Moderate: seepage.	Moderate: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
Ba: Bartle	Moderate: seepage.	Moderate: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
BdA: Bedford	Moderate: seepage.	Moderate: wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness.	Erodes easily, rooting depth.
BdB: Bedford	Moderate: seepage, slope.	Moderate: wetness.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
BdC2: Bedford	Severe: slope.	Moderate: wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
BhF*:						
Berks	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
Weikert	Severe: depth to rock, slope, seepage.	Severe: seepage, thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty.
BmC, BmF: Bloomfield	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty, rooting depth.
Bo: Bonnie	Slight	Severe: ponding.	Severe: slow refill.	Ponding, flooding, frost action.	Erodes easily, ponding.	Wetness, erodes easily.
Br: Bromer	Moderate: seepage.	Severe: piping.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Bu: Burnside	Moderate: seepage, depth to rock.	Severe: large stones.	Moderate: deep to water, slow refill, large stones.	Deep to water	Large stones, erodes easily.	Large stones, erodes easily.
CaE2*:						
Caneyville	Severe: slope.	Severe: thin layer, hard to pack.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
CaE2*:						
Hagerstown	Severe: slope.	Moderate: thin layer, hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
CdF*:						
Caneyville	Severe: slope.	Severe: thin layer, hard to pack.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Rock outcrop.						
CeD2, CeF Chetwynd	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope	Slope.
ChB Cincinnati	Moderate: seepage, slope.	Severe: thin layer.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
ChC2 Cincinnati	Severe: slope.	Severe: thin layer.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
CoB Crider	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable.
CoC2, CoD2, CrC3, CrD3, CsC2 Crider	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope.
CtD2*:						
Crider	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope.
Frederick	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
Cu, Cw Cuba	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily, too sandy.	Erodes easily.
DbA Dubois	Slight	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, frost action.	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
ElB Elkinsville	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
ElC2 Elkinsville	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
FwD2 Frederick	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
FxC2*:						
Frederick	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
FxC2*: Baxter Variant	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope, droughty.
GlD2 Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
GnF*: Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Berks	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
GpF*: Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Berks	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
Ebal	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, rooting depth.
HaC2, HcC3 Hagerstown	Severe: slope.	Moderate: thin layer, hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
HeD2*: Hagerstown	Severe: slope.	Moderate: thin layer, hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
Caneyville	Moderate: depth to rock.	Severe: thin layer, hard to pack.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
HhB Haubstadt	Moderate: seepage, slope.	Moderate: thin layer, piping, wetness.	Severe: no water.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
Hm Haymond	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
HrD2 Hickory	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
MaB Markland	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Erodes easily, percs slowly.	Erodes easily, percs slowly.
MgA McGary	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
Mo: Montgomery	Slight	Severe: hard to pack, ponding.	Severe: slow refill.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
No: Nolin	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.
OtC2: Otwell	Severe: slope.	Moderate: thin layer, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
PeA: Pekin	Moderate: seepage.	Severe: piping.	Severe: slow refill.	Percs slowly, frost action.	Erodes easily, wetness.	Erodes easily, rooting depth.
PeB: Pekin	Moderate: seepage, slope.	Severe: piping.	Severe: slow refill.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
PeC2: Pekin	Severe: slope.	Severe: piping.	Severe: slow refill.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Pg: Peoga	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Ph: Peoga	Moderate: seepage.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness.	Wetness, erodes easily, percs slowly.
Pt*. Pits						
RsB: Rossmoyne	Moderate: seepage, slope.	Moderate: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness, percs slowly.	Erodes easily, rooting depth.
Sf, So: Stendal	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
Wa: Wakeland	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
WeC2, WeD: Wellston	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
ZaB: Zanesville	Moderate: depth to rock, seepage.	Moderate: piping.	Severe: no water.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth.
ZaC2: Zanesville	Moderate: depth to rock, seepage.	Moderate: piping.	Severe: no water.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Zp: Zipp	Slight	Severe: ponding.	Severe: slow refill.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AlB---------------- Alvin	0-10	Fine sandy loam	SM, ML	A-4, A-2	0	100	100	80-95	30-60	<25	NP-4
	10-50	Fine sandy loam, sandy loam, sandy clay loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	100	100	90-100	20-80	15-38	NP-13
	50-60	Stratified sandy loam to fine sand.	SM, SP, SP-SM	A-2, A-3	0-5	95-100	90-100	70-95	4-35	<20	NP-4
AvA---------------- Avonburg	0-11	Silt loam--------	CL, ML, CL-ML	A-4	0	100	100	95-100	75-95	20-30	2-10
	11-23	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	75-95	30-45	10-20
	23-80	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0-3	95-100	95-100	90-100	70-95	30-45	10-20
Ba----------------- Bartle	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	85-100	65-90	20-35	5-15
	8-24	Silt loam, silty clay loam.	CL, CL-ML, ML	A-4, A-6, A-7	0	100	100	90-100	70-90	25-45	5-15
	24-50	Silt loam, silty clay loam, loam.	CL	A-6, A-7	0	100	100	90-100	70-95	30-45	10-25
	50-60	Silty clay loam, silt loam, loam.	CL	A-6, A-7	0	100	100	90-100	70-95	30-45	10-25
BdA, BdB, BdC2--- Bedford	0-9	Silt loam--------	ML, CL-ML	A-4	0	100	100	95-100	85-95	<25	3-6
	9-24	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	95-100	95-100	85-95	25-40	8-15
	24-51	Silty clay loam, silt loam, cherty silty clay loam.	CL, SC	A-6, A-4	0	90-100	55-95	55-95	45-95	25-40	7-15
	51-80	Silty clay, clay, cherty clay.	CL, CH, SC	A-7	0-5	90-100	55-95	55-95	45-90	45-75	20-35
BhF*:											
Berks------------	0-7	Silt loam--------	CL, ML, CL-ML	A-4	0-10	80-100	75-100	65-85	50-75	25-36	5-10
	7-22	Channery loam, very channery silt loam, channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	22-31	Channery loam, very channery silt loam, channery loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	31	Weathered bedrock	---	---	---	---	---	---	---	---	---
Weikert----------	0-12	Channery silt loam, very channery silt loam.	GM, ML, SM	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
BmC, BmF---------- Bloomfield	0-6	Loamy fine sand	SM, SP, SP-SM	A-2-4, A-3	0	100	100	70-90	4-35	---	NP
	6-32	Fine sand, loamy fine sand, sand.	SP, SM, SP-SM	A-2-4, A-3	0	100	100	70-90	4-35	---	NP
	32-65	Fine sand, loamy fine sand, sand.	SM, SP, SP-SM	A-2-4, A-3	0	100	100	65-90	4-35	<20	NP-3

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
Bo----------------- Bonnie	0-7	Silt loam---------	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
	7-42	Silt loam---------	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
	42-60	Silt loam, silty clay loam.	CL	A-4, A-6	0	100	100	90-100	80-100	25-39	8-15
Br----------------- Bromer	0-15	Silt loam---------	ML, CL-ML, CL	A-4, A-6	0	100	95-100	90-100	85-100	20-35	3-13
	15-28	Silt loam, silty clay loam.	CL-ML, CL	A-6, A-4	0	100	95-100	90-100	85-100	25-40	6-20
	28-62	Silty clay loam, silt loam.	CL	A-4, A-6, A-7	0	95-100	90-100	85-100	75-95	30-45	9-24
	62-80	Silty clay, cherty clay, very cherty clay.	CH, GC, CL, SC	A-6, A-7, A-2	0-5	40-70	30-70	25-70	25-65	35-60	15-35
Bu----------------- Burnside	0-16	Silt loam, loam	ML, CL, CL-ML	A-4	0-10	100	100	80-95	75-95	20-35	2-10
	16-50	Channery loam, very channery loam, flaggy silt loam.	SC, GC, SM, GM	A-2, A-4	10-60	35-80	30-60	30-50	26-45	<20	NP-10
	50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CaE2*: Caneyville-------	0-5	Silt loam---------	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	5-21	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	21-25	Clay, silty clay	CH	A-7	0-15	90-100	85-100	75-100	65-100	50-75	30-45
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hagerstown-------	0-4	Silt loam---------	CL	A-4, A-6	0-3	90-100	85-100	80-100	60-90	25-32	8-12
	4-42	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CdF*: Caneyville-------	0-7	Silt loam---------	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	7-24	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
CeD2, CeF--------- Chetwynd	0-4	Loam--------------	CL-ML, CL	A-4, A-6	0	90-100	85-100	75-95	60-95	22-33	4-12
	4-56	Clay loam, sandy clay loam, loam.	SC, CL	A-4, A-6	0	90-100	85-100	70-95	40-75	20-35	8-18
	56-80	Sandy loam, loam, sandy clay loam.	SM-SC, SC, CL-ML, CL	A-2-4, A-2-6, A-4, A-6	0	76-95	65-95	60-90	30-65	20-32	5-15
ChB, ChC2--------- Cincinnati	0-14	Silt loam---------	ML, CL	A-4, A-6	0	100	100	90-100	80-100	25-40	3-16
	14-24	Silty clay loam, loam, silt loam.	CL	A-6, A-4	0	95-100	90-100	90-100	70-100	25-40	8-15
	24-50	Clay loam, silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	95-100	85-95	75-90	65-80	25-40	6-20
	50-80	Clay loam, loam	CL, ML, CL-ML	A-6, A-4	0	95-100	85-95	75-90	65-80	25-40	5-20

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CoB, CoC2, CoD2-- Crider	0-6	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	4-12
	6-26	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	4-20
	26-80	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40
CrC3, CrD3------- Crider	0-5	Silty clay loam	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	4-12
	5-26	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	4-20
	26-80	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40
CsC2------------- Crider	0-12	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	4-12
	12-39	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	4-20
	39-80	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40
CtD2*:											
Crider----------	0-5	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	4-12
	5-24	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	4-20
	24-80	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40
Frederick-------	0-6	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	80-100	75-100	75-95	75-90	<35	NP-15
	6-18	Silty clay loam, silty clay, clay.	CH, MH	A-7	0-5	80-100	75-100	70-95	60-90	50-70	20-40
	18-60	Clay, silty clay	CH	A-7	0-5	90-100	85-100	70-100	60-95	60-85	30-55
	60-80	Clay, silty clay	CH	A-7	0-5	90-100	85-100	75-100	65-95	50-75	24-45
Cu, Cw----------- Cuba	0-46	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-90	25-35	3-12
	46-60	Stratified silt loam to fine sand.	CL, ML, CL-ML	A-4	0	100	80-100	75-100	50-85	15-30	2-10
DbA-------------- Dubois	0-8	Silt loam--------	CL-ML, ML, CL	A-4	0	100	100	90-100	70-95	<25	3-8
	8-22	Silt loam, silty clay loam.	CL	A-4, A-6	0	100	100	90-100	80-95	25-35	8-15
	22-72	Silty clay loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	65-95	20-35	5-15
	72-80	Stratified silt loam and silty clay loam.	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	65-95	20-35	5-15
ElB, ElC2-------- Elkinsville	0-6	Silt loam--------	CL-ML, ML	A-4	0	100	100	90-100	70-90	<25	NP-7
	6-29	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	85-100	65-90	20-35	7-15
	29-60	Loam, sandy clay loam, clay loam.	CL, CL-ML, SC, SM-SC	A-4, A-6	0	100	90-100	75-100	45-80	20-35	5-15

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
FwD2------------- Frederick	0-6	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	80-100	75-100	75-95	75-90	<35	NP-15
	6-43	Silty clay loam, clay, silty clay.	CH	A-7	0-5	90-100	85-100	70-100	60-95	60-85	30-55
	43-80	Clay, silty clay	CH	A-7	0-5	90-100	85-100	75-100	65-95	50-75	24-45
FxC2*:											
Frederick-------	0-7	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0-5	80-100	75-100	75-95	75-90	<35	NP-15
	7-19	Clay, silty clay loam.	CH	A-7	0-5	90-100	85-100	70-100	60-95	60-85	30-55
	19-80	Cherty clay, cherty silty clay loam.	CH	A-7	0-5	90-100	85-100	75-100	65-95	50-75	24-45
Baxter Variant--	0-7	Very cherty silt loam.	GM-GC, GC	A-2, A-4	0-10	40-55	35-50	30-50	25-45	18-25	4-8
	7-16	Very cherty silt loam.	GC	A-2, A-4, A-6	0-10	30-55	25-50	20-50	15-45	23-30	7-11
	16-48	Very cherty clay, cherty clay.	GM, GC	A-7	0-10	45-55	40-50	35-50	35-45	43-56	18-25
	48-61	Cherty silty clay, cherty clay loam.	CL	A-6, A-7	0-10	65-80	60-75	55-75	50-70	34-48	13-22
	61-80	Cherty sandy clay loam, silty clay loam.	CL, SC	A-6, A-7	0-10	70-90	65-85	55-80	25-55	34-43	13-18
GlD2------------- Gilpin	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-31	Channery silt loam, silt loam, very channery silt loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	31-40	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GnF*:											
Gilpin----------	0-3	Loam-------------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	3-30	Channery loam, loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Berks-----------	0-4	Loam-------------	CL, ML, CL-ML	A-4	0-10	80-100	75-100	65-85	50-75	25-36	5-10
	4-24	Channery loam, very channery loam, channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	24	Weathered bedrock	---	---	---	---	---	---	---	---	---
GpF*:											
Gilpin----------	0-3	Loam-------------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	3-30	Channery loam, loam, clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
GpF*:											
Berks	0-4	Loam	CL, ML, CL-ML	A-4	0-10	80-100	75-100	65-85	50-75	25-36	5-10
	4-24	Channery loam, very channery loam, channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	24	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ebal	0-9	Silt loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-100	70-90	25-35	5-15
	9-22	Channery silty clay, channery silty clay loam.	CL, CH, GC	A-7	3-15	60-70	50-70	45-70	40-65	40-55	20-30
	22-64	Clay	CH	A-7	0-3	95-100	90-100	80-100	70-95	60-75	35-45
	64	Weathered bedrock	---	---	---	---	---	---	---	---	---
HaC2 Hagerstown	0-6	Silt loam	CL	A-4, A-6	0-3	90-100	85-100	80-100	60-90	25-32	8-12
	6-15	Silty clay loam, clay loam.	CL	A-6, A-7	0-3	90-100	85-100	80-100	70-95	38-45	15-20
	15-45	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
HcC3 Hagerstown	0-7	Silty clay loam	CL	A-6, A-7	0-3	90-100	85-100	80-100	75-95	30-45	11-20
	7-45	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
HeD2*:											
Hagerstown	0-5	Silt loam	CL	A-4, A-6	0-3	90-100	85-100	80-100	60-90	25-32	8-12
	5-16	Silty clay loam, clay loam.	CL	A-6, A-7	0-3	90-100	85-100	80-100	70-95	38-45	15-20
	16-44	Silty clay loam, silty clay, clay.	CL, CH	A-6, A-7	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	44	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Caneyville	0-5	Silt loam	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	75-100	60-95	20-35	2-12
	5-21	Silty clay, clay, silty clay loam.	CH, CL	A-7	0-3	90-100	85-100	75-100	65-100	42-70	20-45
	21-30	Clay, silty clay	CH	A-7	0-15	90-100	85-100	75-100	65-100	50-75	30-45
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
HhB Haubstadt	0-8	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	100	90-100	80-100	25-40	4-14
	8-24	Silt loam, silty clay loam.	CL, ML	A-6, A-4, A-7	0	100	100	90-100	80-100	25-45	9-19
	24-40	Loam, silt loam, silty clay loam.	CL	A-4, A-6, A-7	0	80-100	75-95	65-90	50-85	25-45	9-19
	40-80	Clay loam, loam, silty clay loam.	CL-ML, CL, GC, SC	A-6, A-4	0	65-90	55-90	50-85	40-75	20-40	4-20
Hm Haymond	0-10	Silt loam	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	10-47	Silt loam	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	47-60	Fine sandy loam, silt loam, loam.	ML, SM	A-4	0	95-100	90-100	80-100	35-90	27-36	4-10

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
HrD2------------- Hickory	0-9	Silt loam, loam	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
	9-42	Clay loam, silty clay loam.	CL	A-6, A-7	0-5	95-100	90-100	80-95	65-80	30-50	15-30
	42-60	Clay loam, sandy loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	85-95	80-95	60-80	20-40	5-20
MaB-------------- Markland	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	7-30	Silty clay, clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	45-60	19-32
	30-60	Stratified clay to silty clay loam.	CL, CH, ML, MH	A-7	0	100	100	90-100	75-95	40-55	15-25
MgA-------------- McGary	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-40	5-15
	7-34	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-100	45-60	25-35
	34-60	Stratified silty clay loam to clay.	CL, CH	A-6, A-7	0	95-100	95-100	95-100	85-100	35-55	20-35
Mo--------------- Montgomery	0-11	Silty clay loam	CL	A-7	0	100	100	100	85-100	40-50	20-30
	11-37	Silty clay loam, silty clay.	CH	A-7	0	100	100	95-100	90-100	50-65	30-42
	37-60	Stratified clay to silty clay loam.	CL, CH	A-7	0	100	100	90-100	85-100	40-55	20-32
No--------------- Nolin	0-10	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	10-52	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23
	52-60	Loam, silt loam, gravelly loam.	ML, CL, CL-ML, GM	A-4, A-6	0-10	50-100	50-100	40-95	35-95	<30	NP-15
OtC2------------- Otwell	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-35	5-15
	6-22	Silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-40	5-20
	22-48	Silty clay loam, loam, silt loam.	CL	A-6, A-7	0	95-100	95-100	85-100	65-90	35-50	20-30
	48-80	Stratified loam to silty clay.	CL	A-6, A-7	0	95-100	90-100	85-100	65-95	35-50	15-25
PeA, PeB, PeC2--- Pekin	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	85-100	65-100	20-30	5-15
	9-27	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-100	25-40	10-20
	27-44	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	88-98	65-90	25-35	5-15
	44-60	Stratified fine sandy loam to silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	80-95	50-85	20-40	5-15
Pg--------------- Peoga	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
	8-55	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	85-100	35-50	20-30
	55-60	Stratified silty clay loam to silt loam.	CL, ML	A-6, A-7	0	100	100	90-100	70-95	35-50	10-25
Ph--------------- Peoga	0-13	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	100	95-100	90-100	70-95	20-35	3-11
	13-32	Silt loam, silty clay loam.	CL-ML, CL	A-6, A-4	0	100	95-100	90-100	70-95	25-40	6-20
	32-80	Silty clay, silty clay loam, very cherty clay.	GC, CL, CH, SC	A-7, A-2-7	0-5	45-75	35-75	30-75	30-70	40-65	15-40

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Pt*. Pits											
RsB---------------- Rossmoyne	0-8	Silt loam--------	ML	A-4	0	90-100	90-100	90-100	85-100	30-40	4-10
	8-24	Silty clay loam, silt loam, clay loam.	CL, ML	A-6, A-7, A-4	0	90-100	90-100	85-100	75-95	30-48	8-20
	24-54	Clay loam, loam, silty clay loam.	CL	A-6, A-4	0	90-100	85-95	80-90	70-85	25-40	9-19
	54-80	Clay loam, loam, clay.	CL	A-6, A-7, A-4	0	80-95	70-90	65-85	60-80	25-42	8-20
Sf, So------------ Stendal	0-10	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	75-90	25-40	5-15
	10-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	75-90	25-40	5-15
Wa---------------- Wakeland	0-10	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	10-60	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
WeC2, WeD--------- Wellston	0-6	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	6-21	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	21-37	Silt loam, loam, channery silt loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	37-52	Channery silt loam, gravelly sandy loam, channery clay loam.	SM-SC, SC, GM-GC, CL	A-1-b, A-2, A-4, A-6	0-15	60-80	45-75	30-70	15-55	20-35	5-15
	52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
ZaB, ZaC2--------- Zanesville	0-7	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	4-15
	7-20	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	20-56	Silt loam, silty clay loam, clay loam.	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	80-100	60-100	20-40	2-20
	56	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Zp---------------- Zipp	0-8	Silty clay-------	CL, CH	A-7, A-6	0	100	100	95-100	90-95	35-55	20-30
	8-42	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	45-60	25-35
	42-60	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-95	45-60	25-35

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
AlB----------------	0-10	10-15	1.45-1.65	2.0-6.0	0.14-0.20	5.1-6.5	Low-----------	0.24	5	3	.5-1
Alvin	10-50	15-18	1.45-1.65	0.6-6.0	0.12-0.20	4.5-6.0	Low-----------	0.24			
	50-60	3-10	1.55-1.75	2.0-6.0	0.05-0.13	5.1-7.8	Low-----------	0.24			
AvA----------------	0-11	10-18	1.30-1.45	0.6-2.0	0.20-0.24	4.5-7.3	Low-----------	0.43	4	5	.5-2
Avonburg	11-23	22-30	1.35-1.50	0.6-2.0	0.18-0.20	4.5-5.5	Moderate-----	0.43			
	23-80	22-30	1.60-1.85	<0.06	0.06-0.08	4.0-5.5	Moderate-----	0.43			
Ba-----------------	0-8	15-26	1.30-1.45	0.6-2.0	0.20-0.24	5.1-7.3	Low-----------	0.43	4	5	1-3
Bartle	8-24	22-35	1.40-1.60	0.6-2.0	0.20-0.22	3.6-7.3	Low-----------	0.43			
	24-50	22-35	1.60-1.80	<0.06	0.06-0.08	4.5-6.0	Low-----------	0.43			
	50-60	22-35	1.40-1.60	0.2-0.6	0.15-0.18	4.5-7.3	Low-----------	0.43			
BdA, BdB, BdC2---	0-9	10-16	1.30-1.45	0.6-2.0	0.22-0.24	3.6-6.5	Low-----------	0.43	4	5	1-2
Bedford	9-24	20-32	1.30-1.45	0.6-2.0	0.18-0.20	3.6-6.5	Moderate-----	0.43			
	24-51	22-35	1.50-1.70	<0.06	0.06-0.08	3.6-5.5	Moderate-----	0.43			
	51-80	45-75	1.30-1.50	0.2-0.6	0.06-0.08	3.6-5.5	Moderate-----	0.32			
BhF*:											
Berks------------	0-7	5-23	1.20-1.50	0.6-6.0	0.12-0.17	3.6-6.5	Low-----------	0.24	3	5	.5-3
	7-22	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low-----------	0.17			
	22-31	5-20	1.20-1.60	2.0-6.0	0.04-0.10	3.6-6.5	Low-----------	0.17			
	31	---	---	---	---	---	-------------	----			
Weikert----------	0-12	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-6.0	Low-----------	0.28	2	8	1-3
	12	---	---	---	---	---	-------------	----			
BmC, BmF----------	0-6	5-10	1.50-1.70	6.0-20	0.10-0.12	5.1-7.8	Low-----------	0.15	5	2	.5-2
Bloomfield	6-32	2-10	1.60-1.80	6.0-20	0.06-0.11	5.1-7.3	Low-----------	0.15			
	32-65	5-13	1.60-1.80	2.0-20	0.05-0.10	5.1-7.8	Low-----------	0.15			
Bo-----------------	0-7	18-27	1.20-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low-----------	0.43	5	6	1-3
Bonnie	7-42	18-27	1.40-1.60	0.2-0.6	0.20-0.22	4.5-5.5	Low-----------	0.43			
	42-60	18-30	1.45-1.65	0.2-0.6	0.18-0.20	4.5-7.8	Low-----------	0.43			
Br-----------------	0-15	10-18	1.25-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.43	4	5	2-4
Bromer	15-28	20-32	1.40-1.60	0.6-2.0	0.18-0.22	4.5-5.5	Moderate-----	0.43			
	28-62	22-34	1.40-1.60	0.06-0.2	0.18-0.22	4.5-6.0	Moderate-----	0.43			
	62-80	45-80	1.40-1.65	0.06-0.2	0.03-0.07	4.5-7.3	High----------	0.32			
Bu-----------------	0-16	20-27	1.20-1.40	0.6-2.0	0.22-0.24	4.5-6.0	Low-----------	0.37	4	5	1-2
Burnside	16-50	15-25	1.40-1.60	0.6-2.0	0.10-0.16	4.5-5.5	Low-----------	0.37			
	50	---	---	---	---	---	-------------	----			
CaE2*:											
Caneyville-------	0-5	10-25	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low-----------	0.43	3	5	2-4
	5-21	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate-----	0.28			
	21-25	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.0-7.8	Moderate-----	0.28			
	25	---	---	---	---	---	-------------	----			
Hagerstown-------	0-4	22-27	1.25-1.40	0.6-2.0	0.22-0.24	4.5-6.5	Low-----------	0.32	4	6	1-3
	4-42	35-60	1.35-1.60	0.6-2.0	0.10-0.20	5.1-7.3	Moderate-----	0.28			
	42	---	---	---	---	---	-------------	----			
CdF*:											
Caneyville-------	0-7	10-25	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low-----------	0.43	3	5	2-4
	7-24	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate-----	0.28			
	24	---	---	---	---	---	-------------	----			

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
CdF*: Rock outcrop.											
CeD2, CeF: Chetwynd	0-4	12-24	1.30-1.50	0.6-2.0	0.20-0.24	4.5-7.3	Low	0.32	5	5	1-3
	4-56	18-25	1.40-1.60	0.6-2.0	0.13-0.17	4.5-6.0	Moderate	0.32			
	56-80	18-25	1.35-1.60	0.6-2.0	0.11-0.17	4.5-6.0	Low	0.32			
ChB, ChC2: Cincinnati	0-14	15-25	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.37	4	6	1-3
	14-24	22-35	1.45-1.65	0.6-2.0	0.15-0.19	4.0-5.5	Low	0.37			
	24-50	24-35	1.60-1.85	0.06-0.6	0.08-0.12	4.0-6.5	Moderate	0.37			
	50-80	24-40	1.55-1.75	0.06-0.6	0.08-0.12	4.5-7.3	Moderate	0.37			
CoB, CoC2, CoD2: Crider	0-6	15-27	1.20-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low	0.32	5	6	2-4
	6-26	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.3	Low	0.28			
	26-80	30-60	1.20-1.55	0.6-2.0	0.12-0.18	4.5-6.5	Moderate	0.28			
CrC3, CrD3: Crider	0-5	27-35	1.20-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low	0.32	4	7	.5-1
	5-26	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.3	Low	0.28			
	26-80	30-60	1.20-1.55	0.6-2.0	0.12-0.18	4.5-6.5	Moderate	0.28			
CsC2: Crider	0-12	15-27	1.20-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low	0.32	5	6	1-2
	12-39	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.3	Low	0.28			
	39-80	30-60	1.20-1.55	0.6-2.0	0.12-0.18	4.5-6.5	Moderate	0.28			
CtD2*: Crider	0-5	15-27	1.20-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low	0.32	5	6	1-2
	5-24	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.3	Low	0.28			
	24-80	30-60	1.20-1.55	0.6-2.0	0.12-0.18	4.5-6.5	Moderate	0.28			
Frederick	0-6	13-27	1.25-1.50	2.0-6.0	0.16-0.24	4.5-6.5	Low	0.32	4	6	1-2
	6-18	35-75	1.20-1.50	0.6-2.0	0.12-0.18	4.5-6.5	Moderate	0.24			
	18-60	40-80	1.20-1.50	0.6-2.0	0.10-0.18	4.5-6.5	High	0.24			
	60-80	40-80	1.20-1.40	0.6-2.0	0.10-0.20	4.5-6.0	High	0.24			
Cu, Cw: Cuba	0-46	12-18	1.30-1.45	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.37	5	5	1-3
	46-60	14-20	1.45-1.65	0.6-2.0	0.19-0.21	4.5-5.5	Low	0.37			
DbA: Dubois	0-8	10-20	1.35-1.45	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	4	5	1-3
	8-22	20-35	1.45-1.65	0.6-2.0	0.18-0.20	4.5-6.0	Moderate	0.43			
	22-72	16-30	1.75-1.85	<0.06	0.06-0.08	4.5-5.5	Moderate	0.43			
	72-80	15-30	1.45-1.65	<0.06	0.06-0.08	4.5-7.3	Moderate	0.43			
ElB, ElC2: Elkinsville	0-6	7-18	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.37	5	5	.5-2
	6-29	19-30	1.40-1.60	0.6-2.0	0.18-0.22	4.5-5.5	Moderate	0.37			
	29-60	16-30	1.45-1.65	0.6-2.0	0.15-0.19	4.5-5.5	Moderate	0.37			
FwD2: Frederick	0-6	13-27	1.25-1.50	2.0-6.0	0.16-0.24	4.5-6.5	Low	0.32	4	6	1-2
	6-43	40-80	1.20-1.50	0.6-2.0	0.10-0.18	4.5-6.5	High	0.24			
	43-80	40-80	1.20-1.40	0.6-2.0	0.10-0.20	4.5-6.0	High	0.24			
FxC2*: Frederick	0-7	13-27	1.25-1.50	2.0-6.0	0.16-0.24	4.5-6.5	Low	0.32	4	6	1-2
	7-19	40-80	1.20-1.50	0.6-2.0	0.10-0.18	4.5-6.5	High	0.24			
	19-80	40-80	1.20-1.40	0.6-2.0	0.10-0.20	4.5-6.0	High	0.24			
Baxter Variant	0-7	12-20	1.20-1.50	0.6-2.0	0.07-0.10	5.1-6.5	Low	0.28	4	8	1-3
	7-16	18-27	1.35-1.65	0.6-2.0	0.05-0.10	5.1-6.5	Low	0.28			
	16-48	40-55	1.40-1.70	0.6-2.0	0.05-0.08	4.5-5.5	Moderate	0.28			
	48-61	30-45	1.40-1.70	0.6-2.0	0.06-0.11	4.5-5.5	Moderate	0.28			
	61-80	30-40	1.40-1.70	0.6-2.0	0.11-0.14	4.5-5.5	Moderate	0.28			

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
GlD2------------- Gilpin	0-5	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low-----------	0.32	3	6	.5-2
	5-31	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24			
	31-40	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24			
	40	---	---	---	---	---	-------------	----			
GnF*:											
Gilpin-----------	0-3	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-6.0	Low-----------	0.32	3	6	.5-2
	3-30	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-6.0	Low-----------	0.24			
	30	---	---	---	---	---	-------------	----			
Berks------------	0-4	5-23	1.20-1.50	0.6-6.0	0.12-0.17	3.6-6.5	Low-----------	0.24	3	5	.5-2
	4-24	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low-----------	0.17			
	24	---	---	---	---	---	-------------	----			
GpF*:											
Gilpin-----------	0-3	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-6.0	Low-----------	0.32	3	6	.5-2
	3-30	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-6.0	Low-----------	0.24			
	30	---	---	---	---	---	-------------	----			
Berks------------	0-4	5-23	1.20-1.50	0.6-6.0	0.12-0.17	3.6-6.5	Low-----------	0.24	3	5	.5-3
	4-24	5-32	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low-----------	0.17			
	24	---	---	---	---	---	-------------	----			
Ebal-------------	0-9	20-28	1.35-1.50	0.6-2.0	0.22-0.24	4.5-6.0	Low-----------	0.37	3	5	.5-2
	9-22	38-50	1.45-1.65	0.2-0.6	0.06-0.09	4.5-6.0	Moderate-----	0.28			
	22-64	55-70	1.55-1.75	<0.06	0.07-0.10	4.5-6.0	High---------	0.28			
	64	---	---	---	---	---	-------------	----			
HaC2------------- Hagerstown	0-6	22-27	1.25-1.40	0.6-2.0	0.22-0.24	4.5-6.5	Low-----------	0.32	4	6	1-3
	6-15	35-40	1.30-1.50	0.6-2.0	0.15-0.22	4.5-6.5	Moderate-----	0.28			
	15-45	35-60	1.35-1.60	0.6-2.0	0.10-0.20	4.5-7.3	Moderate-----	0.28			
	45	---	---	---	---	---	-------------	----			
HcC3------------- Hagerstown	0-7	27-40	1.30-1.45	0.6-2.0	0.21-0.23	4.5-6.5	Low-----------	0.32	4	7	.5-1
	7-45	35-60	1.35-1.60	0.6-2.0	0.10-0.20	4.5-7.3	Moderate-----	0.28			
	45	---	---	---	---	---	-------------	----			
HeD2*:											
Hagerstown-------	0-5	22-27	1.25-1.40	0.6-2.0	0.22-0.24	4.5-6.5	Low-----------	0.32	4	6	1-3
	5-16	35-40	1.30-1.50	0.6-2.0	0.15-0.22	4.5-6.5	Moderate-----	0.28			
	16-44	35-60	1.35-1.60	0.6-2.0	0.10-0.20	4.5-7.3	Moderate-----	0.28			
	44	---	---	---	---	---	-------------	----			
Caneyville-------	0-5	10-25	1.20-1.40	0.6-2.0	0.15-0.22	4.5-7.3	Low-----------	0.43	3	5	2-4
	5-21	36-60	1.35-1.60	0.2-0.6	0.12-0.18	4.5-7.3	Moderate-----	0.28			
	21-30	40-60	1.35-1.60	0.2-0.6	0.12-0.18	5.0-7.8	Moderate-----	0.28			
	30	---	---	---	---	---	-------------	----			
HhB-------------- Haubstadt	0-8	18-27	1.25-1.40	0.6-2.0	0.18-0.20	4.5-6.5	Low-----------	0.43	3	6	1-3
	8-24	20-35	1.30-1.45	0.6-2.0	0.16-0.19	4.0-5.5	Low-----------	0.43			
	24-40	24-35	1.60-1.80	0.06-0.2	0.12-0.16	4.0-5.5	Moderate-----	0.43			
	40-80	18-30	1.55-1.65	0.6-2.0	0.12-0.16	4.5-7.3	Low-----------	0.43			
Hm--------------- Haymond	0-10	10-18	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low-----------	0.37	5	5	1-3
	10-47	10-18	1.30-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Low-----------	0.37			
	47-60	10-18	1.30-1.45	0.6-2.0	0.20-0.22	4.5-7.3	Low-----------	0.37			
HrD2------------- Hickory	0-9	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low-----------	0.37	5	6	1-2
	9-42	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
	42-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	4.5-8.4	Low-----------	0.37			
MaB-------------- Markland	0-7	20-27	1.30-1.45	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.43	3	5	1-3
	7-30	40-55	1.55-1.70	0.06-0.2	0.11-0.13	5.1-7.3	High---------	0.32			
	30-60	35-50	1.55-1.70	0.06-0.2	0.09-0.11	7.4-8.4	High---------	0.32			

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
MgA---------------- McGary	0-7	22-27	1.35-1.50	0.6-2.0	0.22-0.24	6.1-7.3	Low----------	0.43	3	5	1-4
	7-34	35-50	1.60-1.75	0.06-0.2	0.11-0.13	5.6-7.8	High---------	0.32			
	34-60	35-50	1.60-1.75	<0.2	0.14-0.16	7.9-8.4	High---------	0.32			
Mo----------------- Montgomery	0-11	35-40	1.35-1.55	0.2-0.6	0.20-0.23	6.1-7.8	High---------	0.37	5	7	3-6
	11-37	40-55	1.45-1.65	0.06-0.2	0.11-0.18	6.1-7.8	High---------	0.37			
	37-60	35-48	1.50-1.70	0.06-0.2	0.18-0.20	6.6-8.4	Moderate-----	0.37			
No----------------- Nolin	0-10	12-27	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43	5	6	2-4
	10-52	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43			
	52-60	10-30	1.30-1.55	0.6-6.0	0.10-0.23	5.1-8.4	Low----------	0.43			
OtC2--------------- Otwell	0-6	18-27	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	3	5	.5-2
	6-22	22-35	1.30-1.45	0.06-0.2	0.18-0.22	4.5-5.5	Low----------	0.43			
	22-48	18-30	1.60-1.80	<0.06	0.06-0.08	4.5-5.5	Moderate-----	0.43			
	48-80	20-30	1.55-1.65	0.06-0.2	0.19-0.21	5.1-7.3	Moderate-----	0.43			
PeA, PeB, PeC2--- Pekin	0-9	15-26	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.43	4	5	1-3
	9-27	25-35	1.40-1.60	0.6-2.0	0.20-0.22	4.5-7.3	Low----------	0.43			
	27-44	22-30	1.60-1.80	<0.06	0.06-0.08	4.0-6.5	Low----------	0.43			
	44-60	20-34	1.40-1.60	0.6-2.0	0.06-0.08	4.5-7.3	Low----------	0.43			
Pg----------------- Peoga	0-8	15-26	1.30-1.45	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.43	5	5	1-2
	8-55	15-34	1.40-1.60	0.06-0.2	0.18-0.20	4.0-5.5	Moderate-----	0.43			
	55-60	20-34	1.40-1.60	0.06-0.2	0.19-0.21	4.5-6.5	Low----------	0.43			
Ph----------------- Peoga	0-13	12-22	1.25-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	5	5	1-3
	13-32	22-34	1.40-1.60	0.06-0.2	0.18-0.22	4.0-6.5	Low----------	0.43			
	32-80	45-80	1.40-1.65	0.06-0.2	0.03-0.08	4.5-7.3	High---------	0.32			
Pt*. Pits											
RsB---------------- Rossmoyne	0-8	13-27	1.35-1.50	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.37	4	6	1-3
	8-24	22-35	1.40-1.60	0.6-2.0	0.14-0.19	4.5-6.5	Moderate-----	0.37			
	24-54	24-35	1.70-1.90	0.06-0.6	0.06-0.10	4.5-5.5	Moderate-----	0.37			
	54-80	18-45	1.60-1.75	0.06-0.6	0.06-0.10	5.6-8.4	Moderate-----	0.37			
Sf, So------------- Stendal	0-10	10-25	1.30-1.45	0.6-2.0	0.22-0.24	4.5-6.5	Low----------	0.37	5	5	1-3
	10-60	18-35	1.45-1.65	0.6-2.0	0.20-0.22	4.5-5.5	Low----------	0.37			
Wa----------------- Wakeland	0-10	10-17	1.30-1.50	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5	1-3
	10-60	10-17	1.30-1.50	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37			
WeC2, WeD--------- Wellston	0-6	13-27	1.30-1.50	0.6-2.0	0.18-0.22	5.1-7.3	Low----------	0.37	4	6	1-3
	6-21	18-35	1.30-1.65	0.6-2.0	0.17-0.21	4.5-6.5	Low----------	0.37			
	21-37	15-30	1.30-1.60	0.6-2.0	0.12-0.17	4.5-6.0	Low----------	0.37			
	37-52	15-30	1.30-1.60	0.6-2.0	0.06-0.16	4.5-6.0	Low----------	0.20			
	52	---	---	---	---	---	-------------	----			
ZaB, ZaC2--------- Zanesville	0-7	12-27	1.35-1.40	0.6-2.0	0.19-0.23	4.5-7.3	Low----------	0.43	3	6	1-2
	7-20	18-35	1.35-1.45	0.6-2.0	0.17-0.22	4.5-7.3	Low----------	0.37			
	20-56	18-33	1.50-1.75	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.37			
	56	---	---	---	---	---	-------------	----			
Zp----------------- Zipp	0-8	30-45	1.40-1.55	0.2-2.0	0.12-0.21	5.6-7.3	High---------	0.28	5	4	1-3
	8-42	40-55	1.55-1.70	0.06-0.2	0.11-0.13	5.6-7.3	High---------	0.28			
	42-60	40-50	1.55-1.70	0.06-0.2	0.08-0.10	6.6-8.4	High---------	0.28			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "frequent," "brief," "apparent," and "perched" are explaine
symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a
were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potent fros actio
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
AlB---------------- Alvin	B	None---------	---	---	>6.0	---	---	>60	---	Modera
AvA---------------- Avonburg	D	None---------	---	---	1.0-3.0	Perched	Jan-Apr	>60	---	High--
Ba----------------- Bartle	D	None---------	---	---	1.0-2.0	Perched	Jan-Apr	>60	---	High--
BdA, BdB, BdC2----- Bedford	C	None---------	---	---	1.5-3.5	Perched	Mar-Apr	>60	---	High--
BhF*:										
Berks-------------	C	None---------	---	---	>6.0	---	---	20-40	Soft	Low---
Weikert-----------	C/D	None---------	---	---	>6.0	---	---	10-20	Soft	Modera
BmC, BmF----------- Bloomfield	A	None---------	---	---	>6.0	---	---	>60	---	Low---
Bo----------------- Bonnie	C/D	Frequent----	Brief to long.	Jan-Jun	+.5-1.0	Apparent	Jan-Jun	>60	---	High--
Br----------------- Bromer	C	None---------	---	---	1.0-3.0	Perched	Jan-Apr	>60	---	High--
Bu----------------- Burnside	B	Occasional	Brief-----	Mar-Jun	3.0-5.0	Apparent	Feb-Jun	40-65	Hard	Modera
CaE2*:										
Caneyville--------	C	None---------	---	---	>6.0	---	---	20-40	Hard	Modera
Hagerstown--------	C	None---------	---	---	>6.0	---	---	40-60	---	Modera

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
CdF*:										
Caneyville	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate
Rock outcrop.										
CeD2, CeF: Chetwynd	B	None	---	---	>6.0	---	---	>60	---	Moderate
ChB, ChC2: Cincinnati	C	None	---	---	2.5-4.0	Perched	Jan-Apr	>60	---	High
CoB, CoC2, CoD2, CrC3, CrD3, CsC2: Crider	B	None	---	---	>6.0	---	---	>60	---	Moderate
CtD2*:										
Crider	B	None	---	---	>6.0	---	---	>60	---	Moderate
Frederick	B	None	---	---	>6.0	---	---	>60	---	Moderate
Cu: Cuba	B	Frequent	Brief	Jan-May	>6.0	---	---	>60	---	High
Cw: Cuba	B	Occasional	Brief	Jan-May	>6.0	---	---	>60	---	High
DbA: Dubois	C	None	---	---	1.0-3.0	Apparent	Jan-Apr	>60	---	High
ElB, ElC2: Elkinsville	B	None	---	---	>6.0	---	---	>60	---	High
FwD2: Frederick	B	None	---	---	>6.0	---	---	>60	---	Moderate
FxC2*:										
Frederick	B	None	---	---	>6.0	---	---	>60	---	Moderate
Baxter Variant	B	None	---	---	>6.0	---	---	>60	---	Moderate

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potenti frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
GlD2: Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	Moderat
GnF*:										
Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	Moderat
Berks	C	None	---	---	>6.0	---	---	20-40	Soft	Low
GpF*:										
Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	Moderat
Berks	C	None	---	---	>6.0	---	---	20-40	Soft	Low
Ebal	B	None	---	---	3.0-6.0	Perched	Nov-Mar	50-80	Soft	Moderat
HaC2, HcC3: Hagerstown	C	None	---	---	>6.0	---	---	40-60	---	Moderat
HeD2*:										
Hagerstown	C	None	---	---	>6.0	---	---	40-60	---	Moderat
Caneyville	C	None	---	---	>6.0	---	---	20-40	Hard	Moderat
HhB: Haubstadt	C	None	---	---	1.5-3.0	Perched	Jan-Apr	>60	---	Moderat
Hm: Haymond	B	Frequent	Brief	Jan-May	>6.0	---	---	>60	---	High
HrD2: Hickory	C	None	---	---	>6.0	---	---	>60	---	Moderat
MaB: Markland	C	None	---	---	3.0-6.0	Perched	Mar-Apr	>60	---	Moderat
MgA: McGary	C	None	---	---	1.0-3.0	Apparent	Jan-Apr	>60	---	Moderat

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Mo------------------ Montgomery	D	None----------	---	---	+1-1.0	Apparent	Dec-May	>60	---	Moderate
No------------------ Nolin	B	Frequent-----	Brief to long.	Feb-May	3.0-6.0	Apparent	Feb-Mar	>60	---	Moderate
OtC2---------------- Otwell	C	None----------	---	---	2.0-3.5	Perched	Jan-Apr	>60	---	High------
PeA, PeB, PeC2---- Pekin	C	None----------	---	---	2.0-6.0	Apparent	Mar-Apr	>60	---	High------
Pg------------------ Peoga	C	None----------	---	---	0-1.0	Apparent	Jan-May	>60	---	High------
Ph------------------ Peoga	C	None----------	---	---	0-1.0	Perched	Jan-May	>60	---	High------
Pt*. Pits										
RsB----------------- Rossmoyne	C	None----------	---	---	1.5-3.0	Perched	Jan-Apr	>60	---	High------
Sf------------------ Stendal	C	Frequent-----	Brief to very long.	Jan-May	1.0-3.0	Apparent	Jan-Apr	>60	---	High------
So------------------ Stendal	C	Occasional	Brief to very long.	Jan-May	1.0-3.0	Apparent	Jan-Apr	>60	---	High------
Wa------------------ Wakeland	C	Frequent-----	Brief to long.	Jan-May	1.0-3.0	Apparent	Jan-Apr	>60	---	High------
WeC2, WeD---------- Wellston	B	None----------	---	---	>6.0	---	---	>40	Hard	High------
ZaB, ZaC2---------- Zanesville	C	None----------	---	---	2.0-3.0	Perched	Dec-Apr	>40	Hard	Moderate
Zp------------------ Zipp	D	None----------	---	---	+.5-1.0	Apparent	Dec-May	>60	---	Moderate

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Alvin	Coarse-loamy, mixed, mesic Typic Hapludalfs
Avonburg	Fine-silty, mixed, mesic Aeric Fragiaqualfs
*Bartle	Fine-silty, mixed, mesic Aeric Fragiaqualfs
Baxter Variant	Clayey-skeletal, mixed, mesic Typic Paleudults
*Bedford	Fine-silty, mixed, mesic Typic Fragiudults
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Bloomfield	Sandy, mixed, mesic Psammentic Hapludalfs
Bonnie	Fine-silty, mixed, acid, mesic Typic Fluvaquents
Bromer	Fine-silty, mixed, mesic Aeric Ochraqualfs
Burnside	Loamy-skeletal, mixed, acid, mesic Typic Udifluvents
Caneyville	Fine, mixed, mesic Typic Hapludalfs
*Chetwynd	Fine-loamy, mixed, mesic Typic Hapludults
Cincinnati	Fine-silty, mixed, mesic Typic Fragiudalfs
Crider	Fine-silty, mixed, mesic Typic Paleudalfs
*Cuba	Fine-silty, mixed, mesic Fluventic Dystrochrepts
Dubois	Fine-silty, mixed, mesic Aeric Fragiaqualfs
Ebal	Fine, mixed, mesic Ultic Hapludalfs
Elkinsville	Fine-silty, mixed, mesic Ultic Hapludalfs
*Frederick	Clayey, mixed, mesic Typic Paleudults
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Hagerstown	Fine, mixed, mesic Typic Hapludalfs
Haubstadt	Fine-silty, mixed, mesic Aquic Fragiudalfs
Haymond	Coarse-silty, mixed, nonacid, mesic Typic Udifluvents
Hickory	Fine-loamy, mixed, mesic Typic Hapludalfs
Markland	Fine, mixed, mesic Typic Hapludalfs
McGary	Fine, mixed, mesic Aeric Ochraqualfs
Montgomery	Fine, mixed, mesic Typic Haplaquolls
Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Otwell	Fine-silty, mixed, mesic Typic Fragiudalfs
*Pekin	Fine-silty, mixed, mesic Aquic Fragiudalfs
*Peoga	Fine-silty, mixed, mesic Typic Ochraqualfs
Rossmoyne	Fine-silty, mixed, mesic Aquic Fragiudalfs
*Stendal	Fine-silty, mixed, acid, mesic Aeric Fluvaquents
Wakeland	Coarse-silty, mixed, nonacid, mesic Aeric Fluvaquents
Weikert	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Wellston	Fine-silty, mixed, mesic Ultic Hapludalfs
Zanesville	Fine-silty, mixed, mesic Typic Fragiudalfs
Zipp	Fine, mixed, nonacid, mesic Typic Haplaquepts

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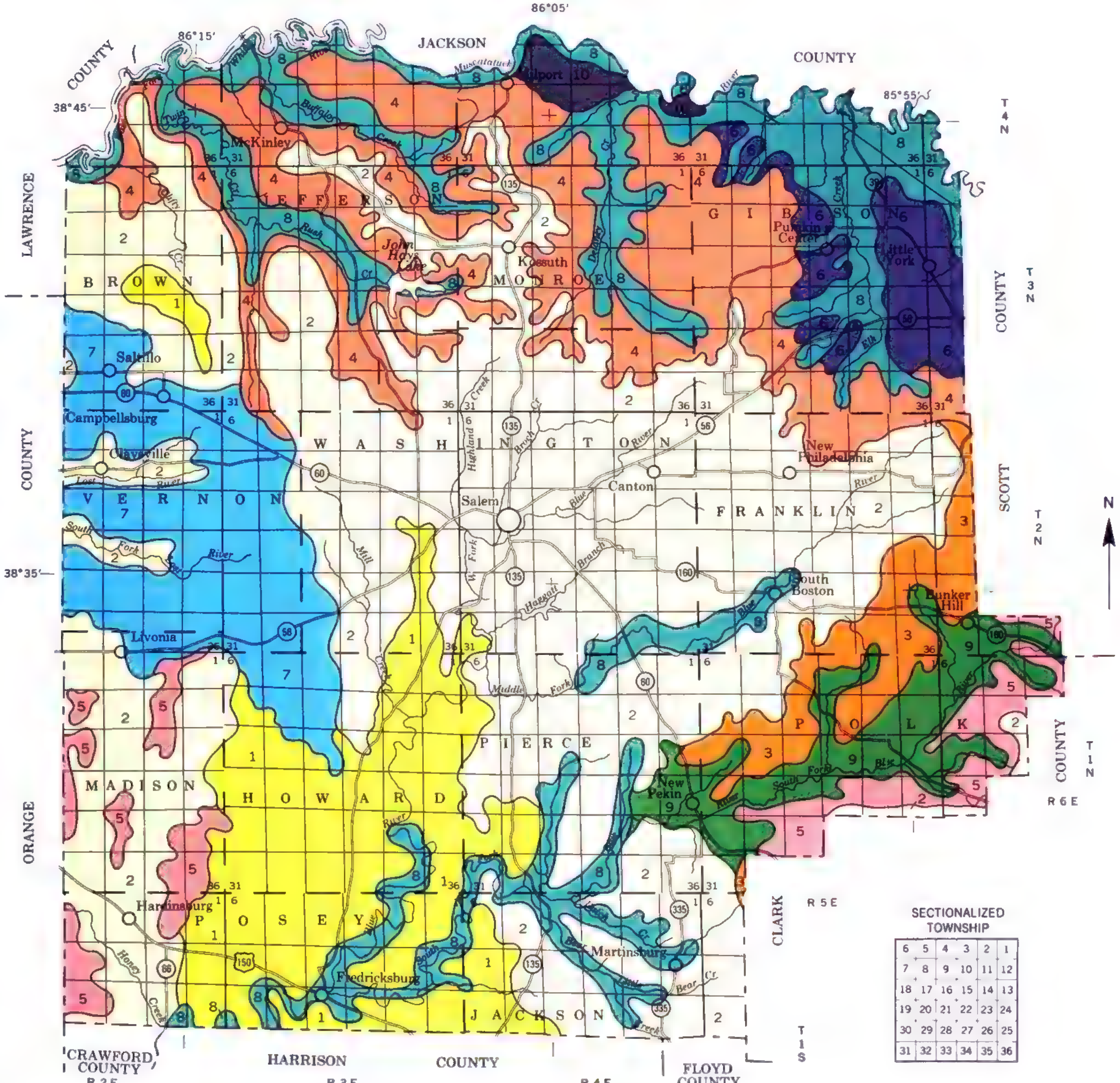


Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

LEGEND

AREA DOMINATED BY DEEP, GENTLY SLOPING TO MODERATELY STEEP SOILS ON KARST UPLANDS

1 — Crider-Frederick: Deep, gently sloping to moderately steep, well drained soils formed in loess and the underlying limestone residuum, on karst uplands

AREAS DOMINATED BY DEEP, NEARLY LEVEL TO STRONGLY SLOPING SOILS ON UPLANDS

2 — Crider-Bedford: Deep, nearly level to strongly sloping, well drained and moderately well drained soils formed in loess and the underlying limestone residuum, on uplands

3 — Wellston-Zanesville: Deep, gently sloping to strongly sloping, well drained and moderately well drained soils formed in loess and the underlying material weathered from sandstone and shale or from sandstone and siltstone, on uplands

AREAS DOMINATED BY SHALLOW TO DEEP, WELL DRAINED SOILS ON UPLANDS

4 — Berks-Weikert-Wellston: Shallow to deep, moderately sloping to very steep, well drained soils formed in sandstone, shale, and siltstone residuum or in loess and sandstone and shale residuum, on uplands

5 — Gilpin-Berks: Moderately deep, strongly sloping to very steep, well drained soils formed in sandstone, siltstone, and shale residuum, on uplands

AREAS DOMINATED BY DEEP, WELL DRAINED TO SOMEWHAT POORLY DRAINED SOILS ON UPLANDS AND LAKE PLAINS

6 — Cincinnati-Dubois-Haubstadt: Deep, nearly level to moderately sloping, well drained to somewhat poorly drained soils formed in loess and the underlying glacial till or in loess and the underlying lacustrine deposits, on uplands and lake plains

7 — Bedford-Bromer: Deep, nearly level to moderately sloping, moderately well drained and somewhat poorly drained soils formed in loess and limestone residuum or in loess, silty sediments, and limestone residuum, on uplands

AREAS DOMINATED BY DEEP, SOMEWHAT POORLY DRAINED AND WELL DRAINED SOILS ON BOTTOM LAND

8 — Stendal-Haymond: Deep, nearly level, somewhat poorly drained and well drained soils formed in alluvium, on bottom land

AREAS DOMINATED BY DEEP, WELL DRAINED TO SOMEWHAT POORLY DRAINED SOILS ON BOTTOM LAND AND TERRACES

9 — Cuba-Pekin-Bartle: Deep, nearly level to moderately sloping, well drained to somewhat poorly drained soils formed in acid alluvium or in acid, silty sediments, on bottom land and terraces

AREAS DOMINATED BY DEEP, VERY POORLY DRAINED AND SOMEWHAT POORLY DRAINED SOILS ON LACUSTRINE TERRACES

10 — Zipp-McGary: Deep, nearly level, very poorly drained and somewhat poorly drained soils formed in lacustrine sediments, on terraces

Compiled 1986

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION
INDIANA DEPARTMENT OF NATURAL RESOURCES
SOIL AND WATER CONSERVATION COMMITTEE

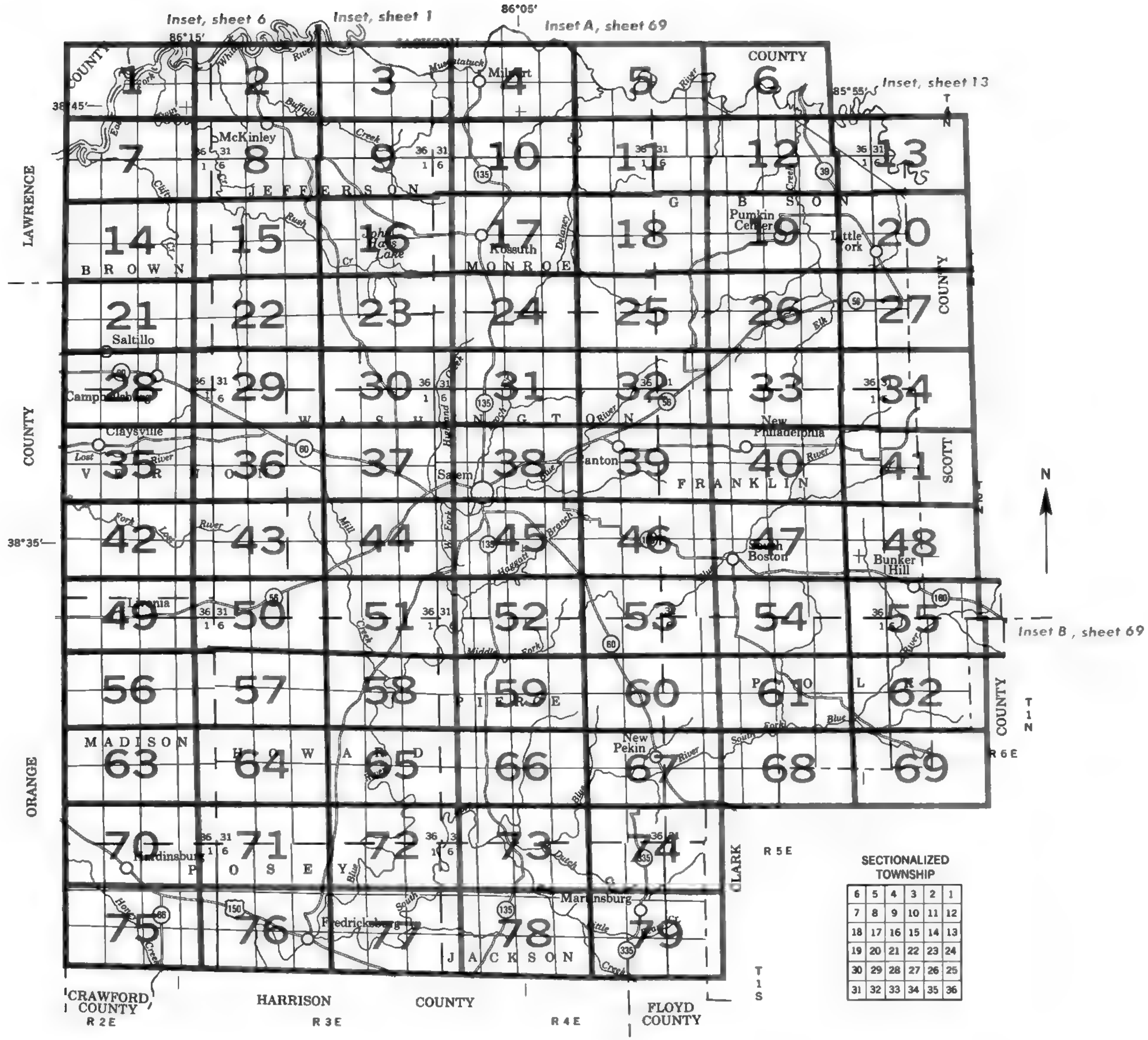
GENERAL SOIL MAP

WASHINGTON COUNTY, INDIANA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km



INDEX TO MAP SHEETS
WASHINGTON COUNTY, INDIANA

Scale 1:190,080

1 0 1 2 3 Miles

1 0 3 6 Km

SOIL LEGEND

Map symbols consist of a combination of letters or of letters and a number. The first capital letter is the initial one of the map unit name. The lowercase letter that follows separates map units having names that begin with the same letter, except it does not separate sloping or eroded phases. The second capital letter indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas. A final number of 2 indicates that the soil is eroded and 3 that it is severely eroded.

SYMBOL	NAME
AB	Alvin fine sandy loam, 2 to 6 percent slopes
AvA	Avonburg silt loam, 0 to 2 percent slopes
Ba	Bartle silt loam
BdA	Bedford silt loam, 0 to 2 percent slopes
BdB	Bedford silt loam, 2 to 6 percent slopes
BdC2	Bedford silt loam, 6 to 12 percent slopes, eroded
BhF	Berks-Weikert complex, 25 to 75 percent slopes
BmC	Bloomfield loamy fine sand, 6 to 18 percent slopes
BmF	Bloomfield loamy fine sand, 18 to 40 percent slopes
Bo	Bonnie silt loam, frequently flooded
Br	Bromer silt loam
Bu	Burnside silt loam, occasionally flooded
CaE2	Caneyville-Hagerstown silt loams, 18 to 25 percent slopes, eroded
CdF	Caneyville-Rock outcrop complex, 25 to 50 percent slopes
CeD2	Chetwynd loam, 8 to 18 percent slopes, eroded
CeF	Chetwynd loam, 18 to 35 percent slopes
ChB	Cincinnati silt loam, 2 to 6 percent slopes
ChC2	Cincinnati silt loam, 6 to 12 percent slopes, eroded
CoB	Crider silt loam, 2 to 6 percent slopes
CoC2	Crider silt loam, 6 to 12 percent slopes, eroded
CoD2	Crider silt loam, 12 to 18 percent slopes, eroded
CrC3	Crider silty clay loam, 6 to 12 percent slopes, severely eroded
CrD3	Crider silty clay loam, 12 to 18 percent slopes, severely eroded
CsC2	Crider silt loam, karst, 4 to 12 percent slopes, eroded
CtD2	Crider-Frederick silt loams, karst, 12 to 22 percent slopes, eroded
Cu	Cuba silt loam, frequently flooded
Cw	Cuba silt loam, occasionally flooded
DbA	Dubois silt loam, 0 to 2 percent slopes
ElB	Elkinsville silt loam, 2 to 6 percent slopes
ElC2	Elkinsville silt loam, 6 to 12 percent slopes, eroded
FwD2	Frederick silt loam, karst, 12 to 22 percent slopes, eroded
FxC2	Frederick-Baxter Variant complex, karst, 4 to 12 percent slopes, eroded
GlD2	Gilpin silt loam, 12 to 18 percent slopes, eroded
GnF	Gilpin-Berks loams, 18 to 50 percent slopes
GpF	Gilpin-Berks-Ebal complex, 18 to 50 percent slopes
HaC2	Hagerstown silt loam, 6 to 12 percent slopes, eroded
HcC3	Hagerstown silty clay loam, 6 to 12 percent slopes, severely eroded
HeD2	Hagerstown-Caneyville silt loams, 12 to 18 percent slopes, eroded
HhB	Haubstadt silt loam, 2 to 6 percent slopes
Hm	Haymond silt loam, frequently flooded
HrD2	Hickory silt loam, 12 to 18 percent slopes, eroded
MaB	Markland silt loam, 2 to 8 percent slopes
MgA	McGary silt loam, 0 to 2 percent slopes
Mo	Montgomery silty clay loam
No	Nolin silt loam, frequently flooded
OtC2	Otwell silt loam, 6 to 12 percent slopes, eroded
PeA	Pekin silt loam, 0 to 2 percent slopes
PeB	Pekin silt loam, 2 to 6 percent slopes
PeC2	Pekin silt loam, 6 to 12 percent slopes, eroded
Pg	Peoga silt loam
Pn	Peoga silt loam, clayey substratum
Pt	Pits, quarries
RsB	Rossmoyne silt loam, 2 to 6 percent slopes
St	Stendal silt loam, frequently flooded
So	Stendal silt loam, occasionally flooded
Wa	Wakeland silt loam, frequently flooded
WeC2	Wellston silt loam, 6 to 12 percent slopes, eroded
WeD	Wellston silt loam, 12 to 18 percent slopes
ZaB	Zanesville silt loam, 1 to 6 percent slopes
ZaC2	Zanesville silt loam, 6 to 12 percent slopes, eroded
Zp	Zipp silty clay

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label) — Small Airport

- Small airport, airfield, park, oilfield, cemetery, or flood pool — FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate — 21
- Federal — 173
- State — 28
- County, farm or ranch — 283

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small — water, w

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — Gas
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) — CANAL
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water, w
- Intermittent — int, i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — ChB, HaC2

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE (normally not shown) — S

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Calcareous spot
- Muck spot

WASHINGTON COUNTY, INDIANA NO. 1

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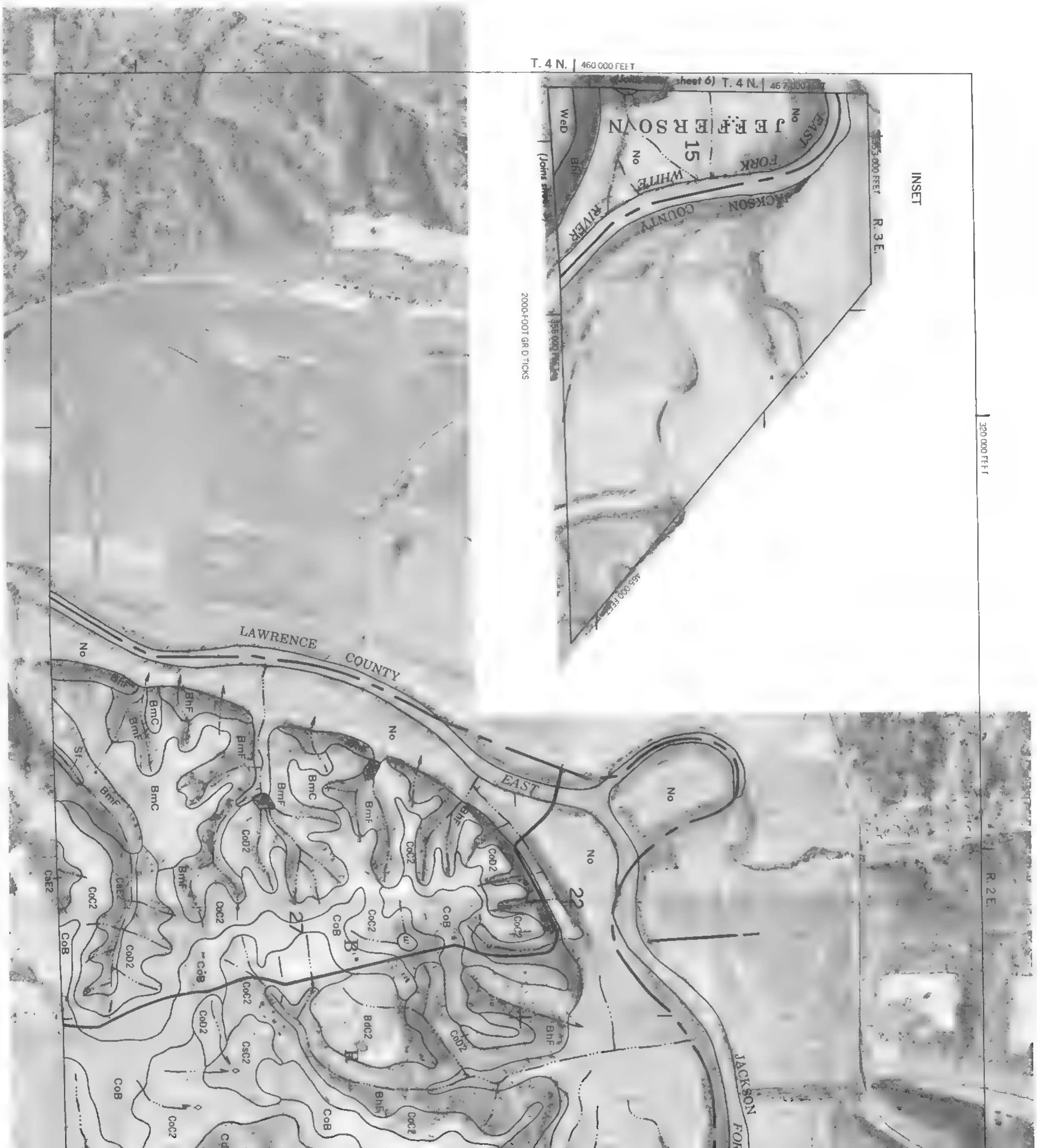

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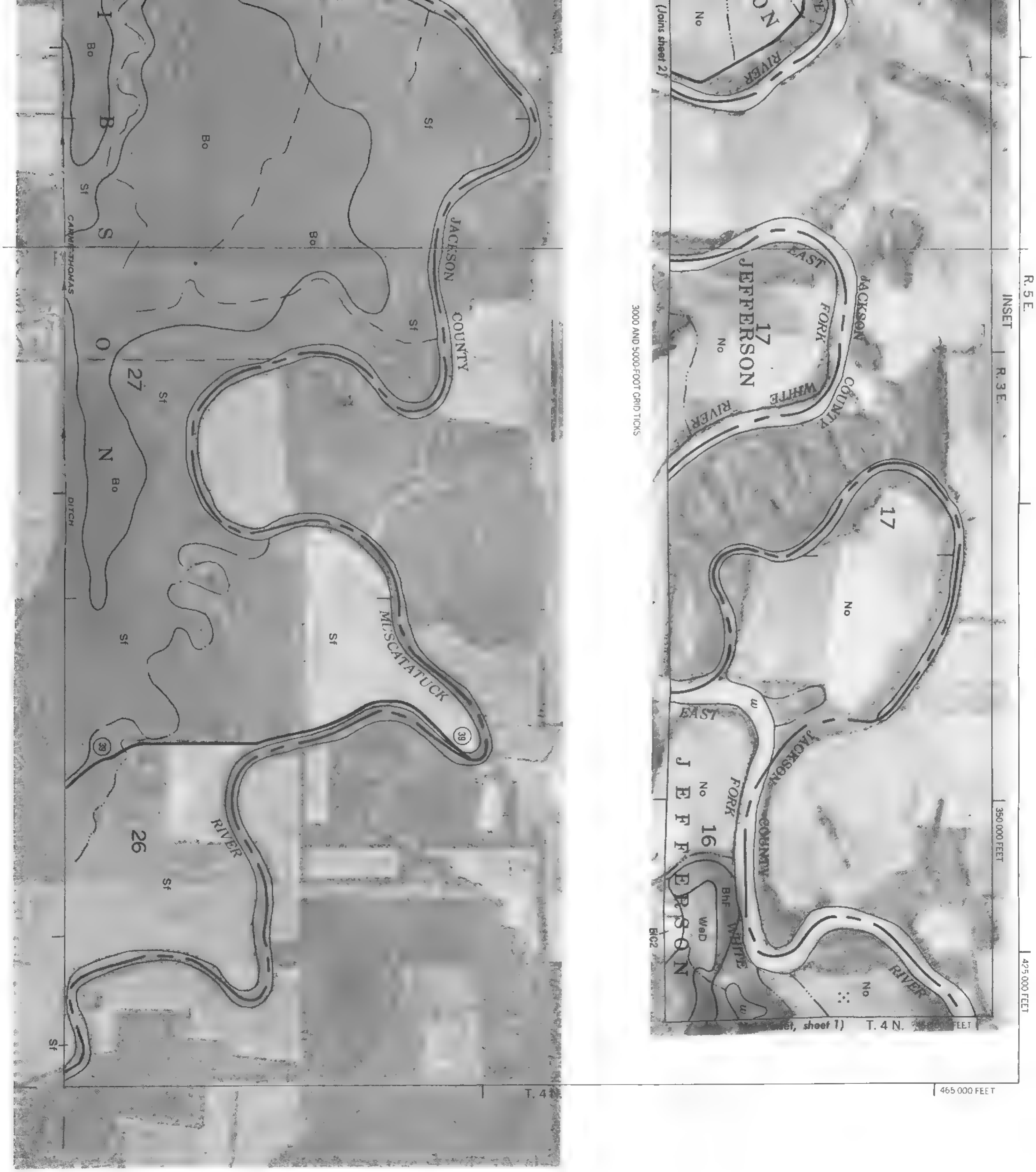

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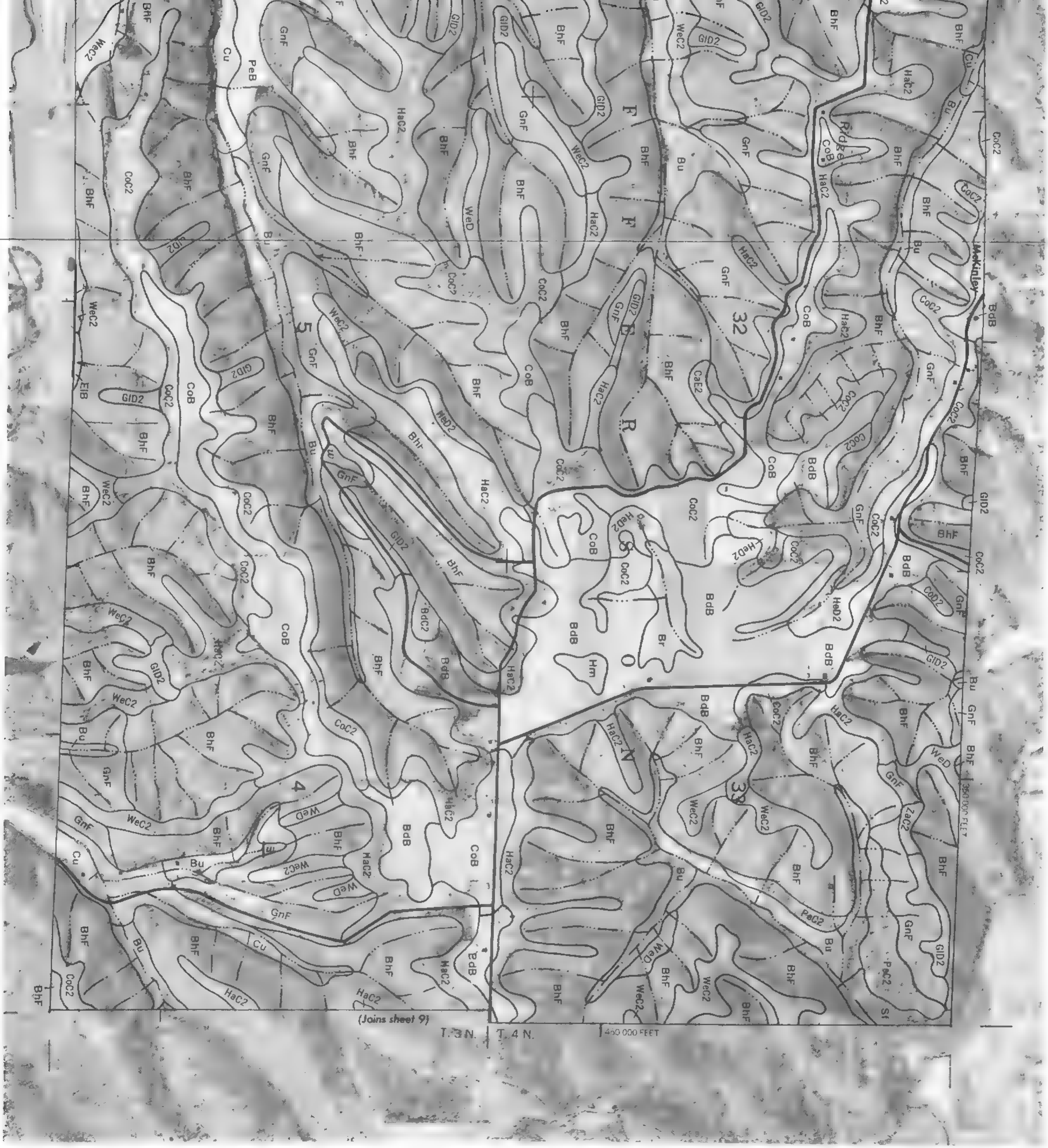

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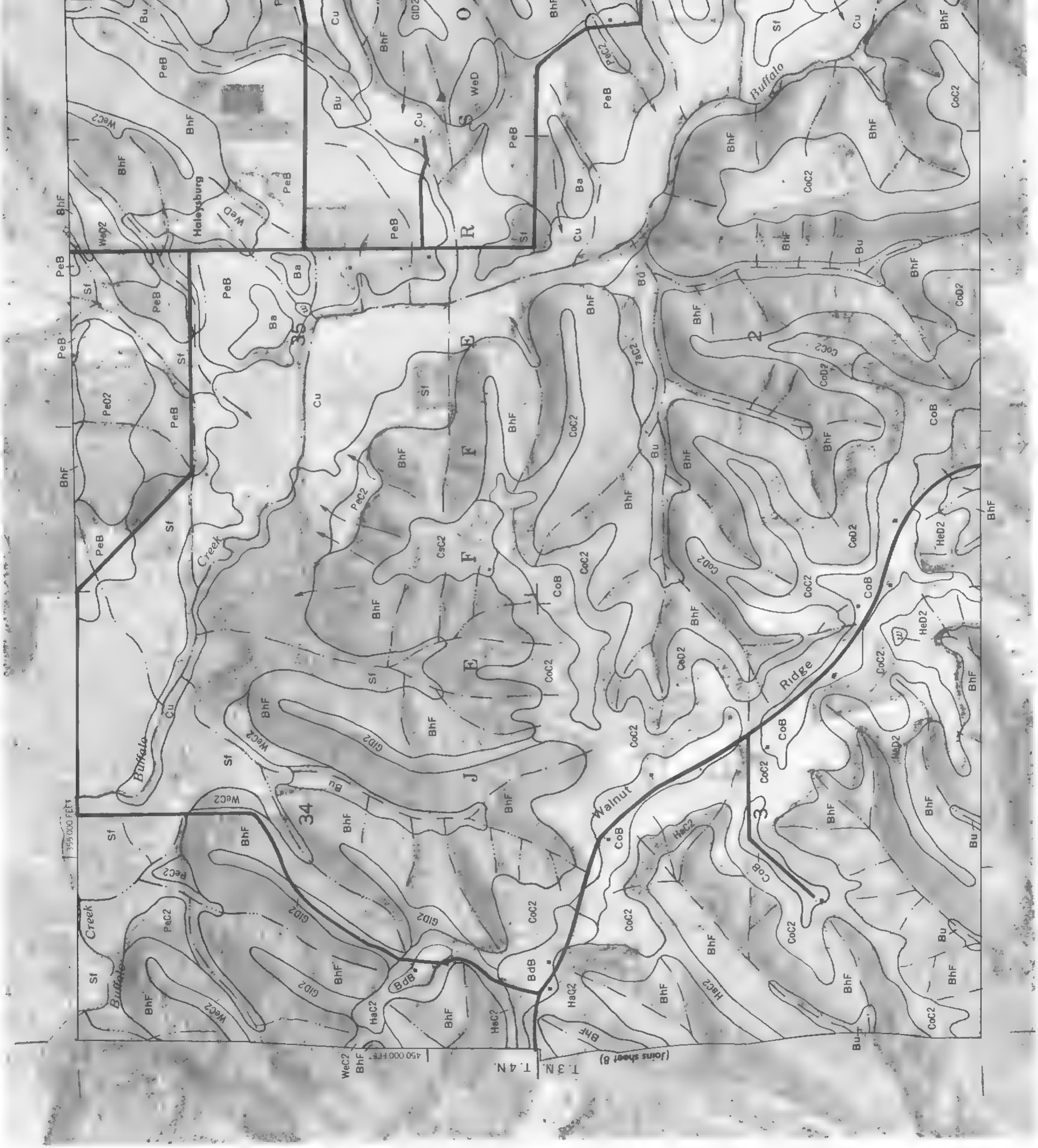

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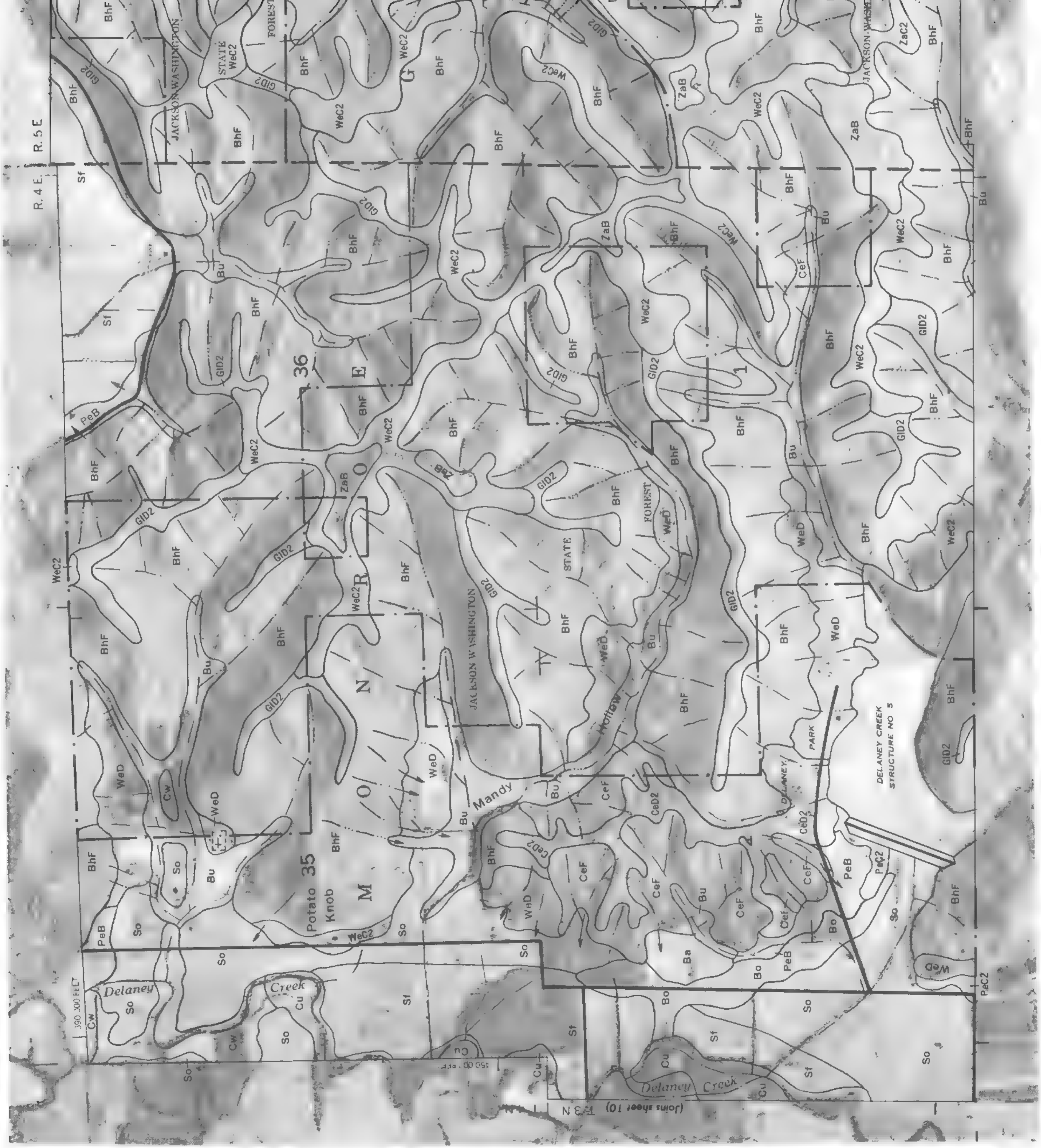

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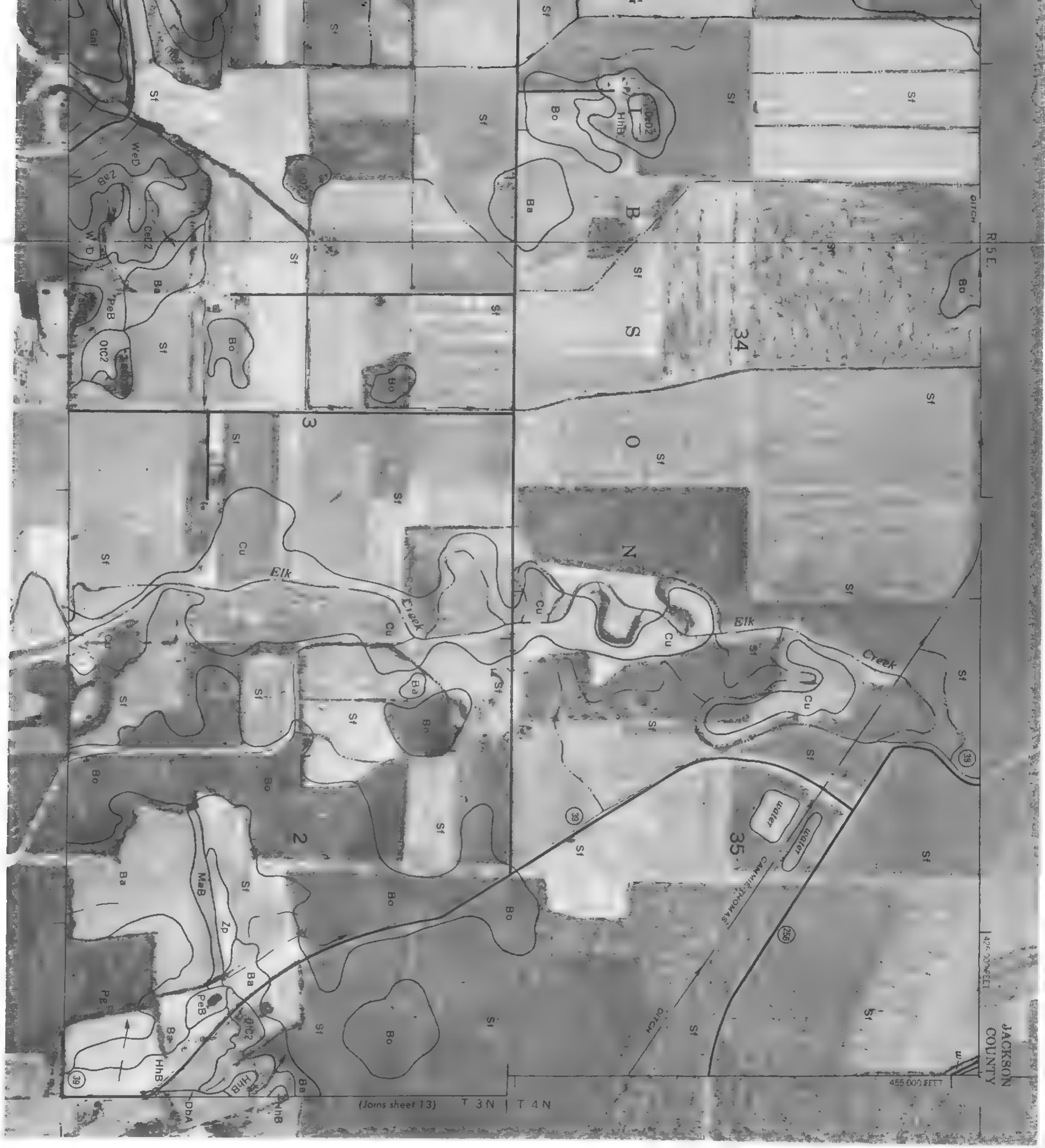

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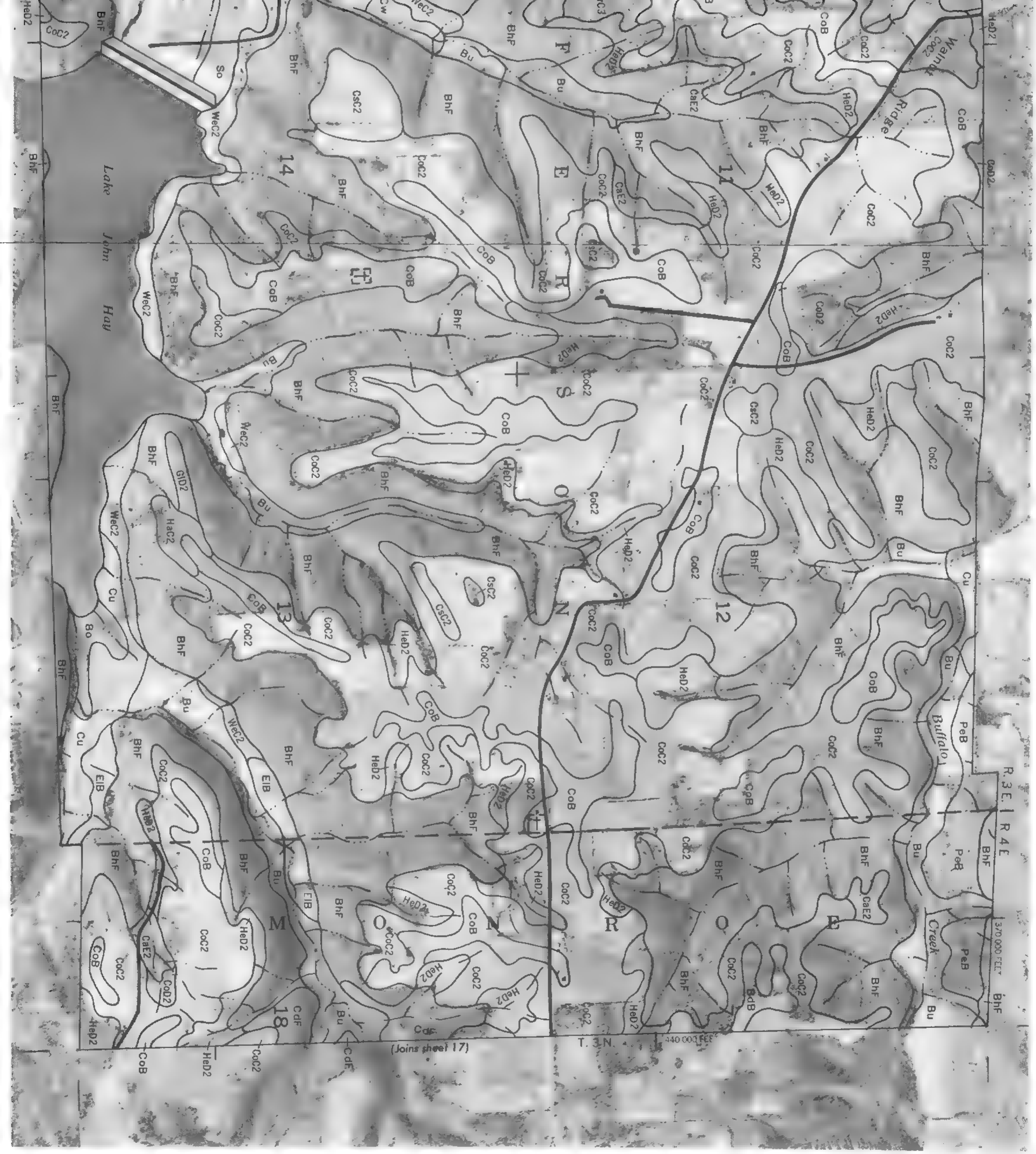

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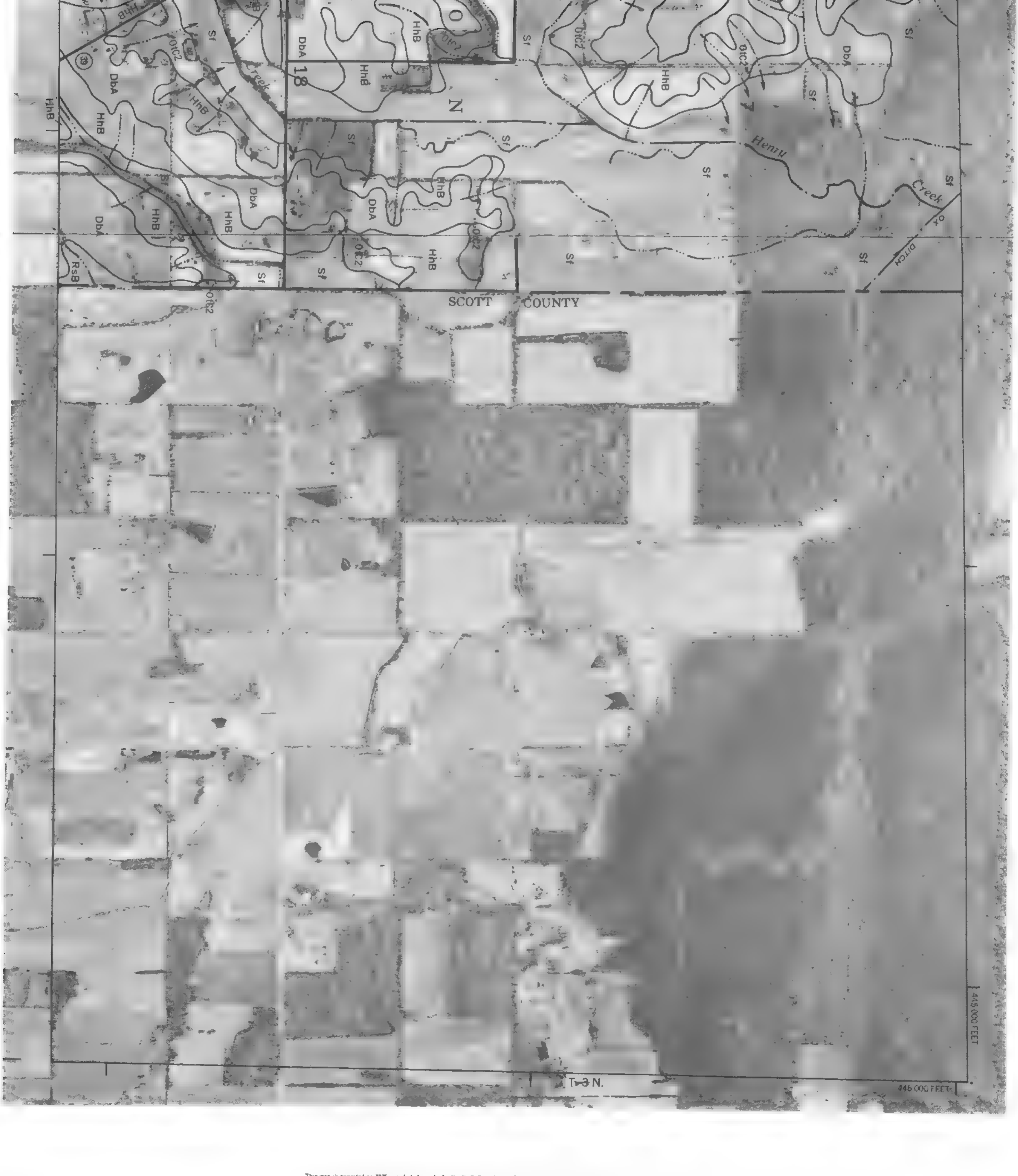

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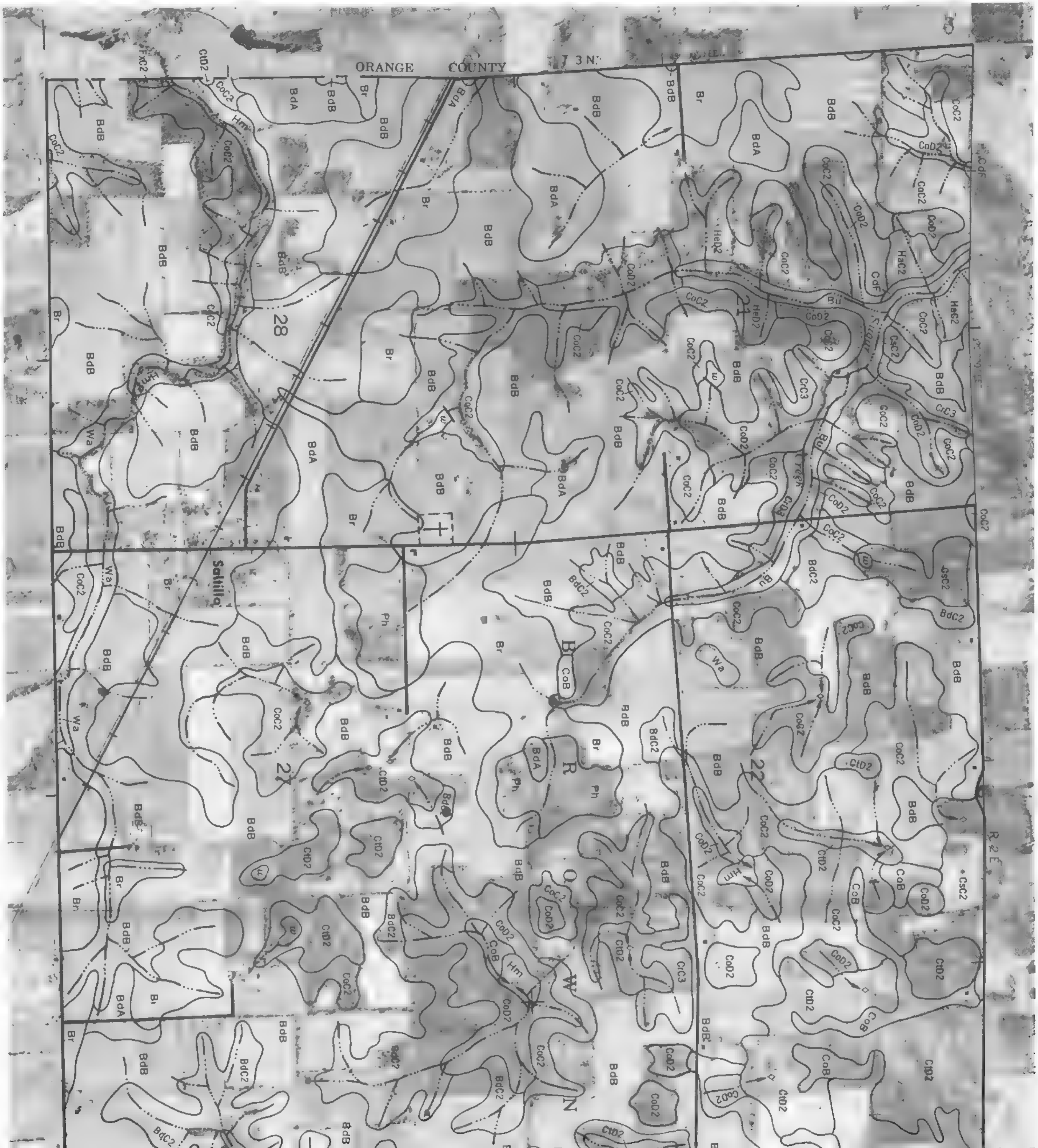

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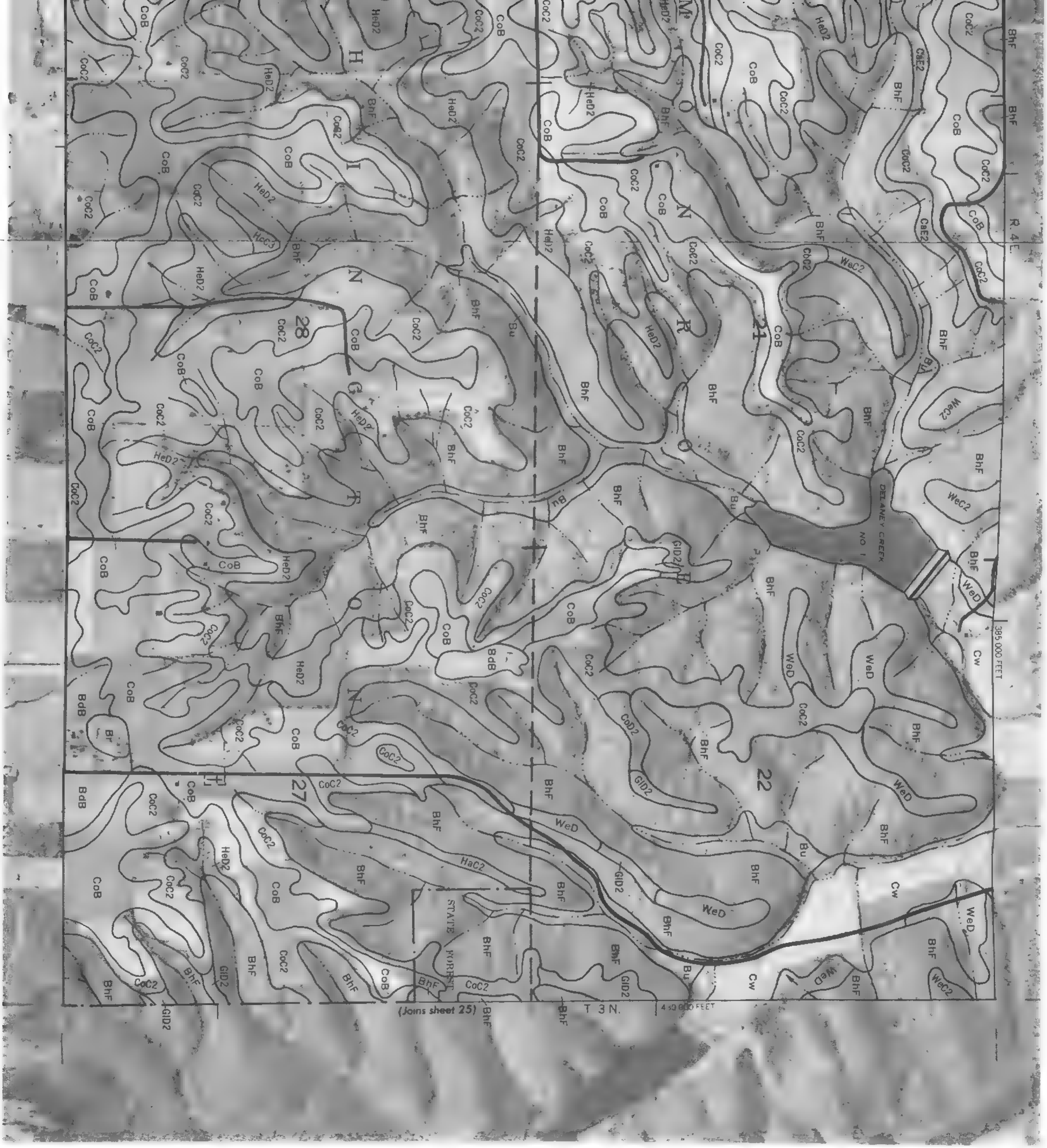

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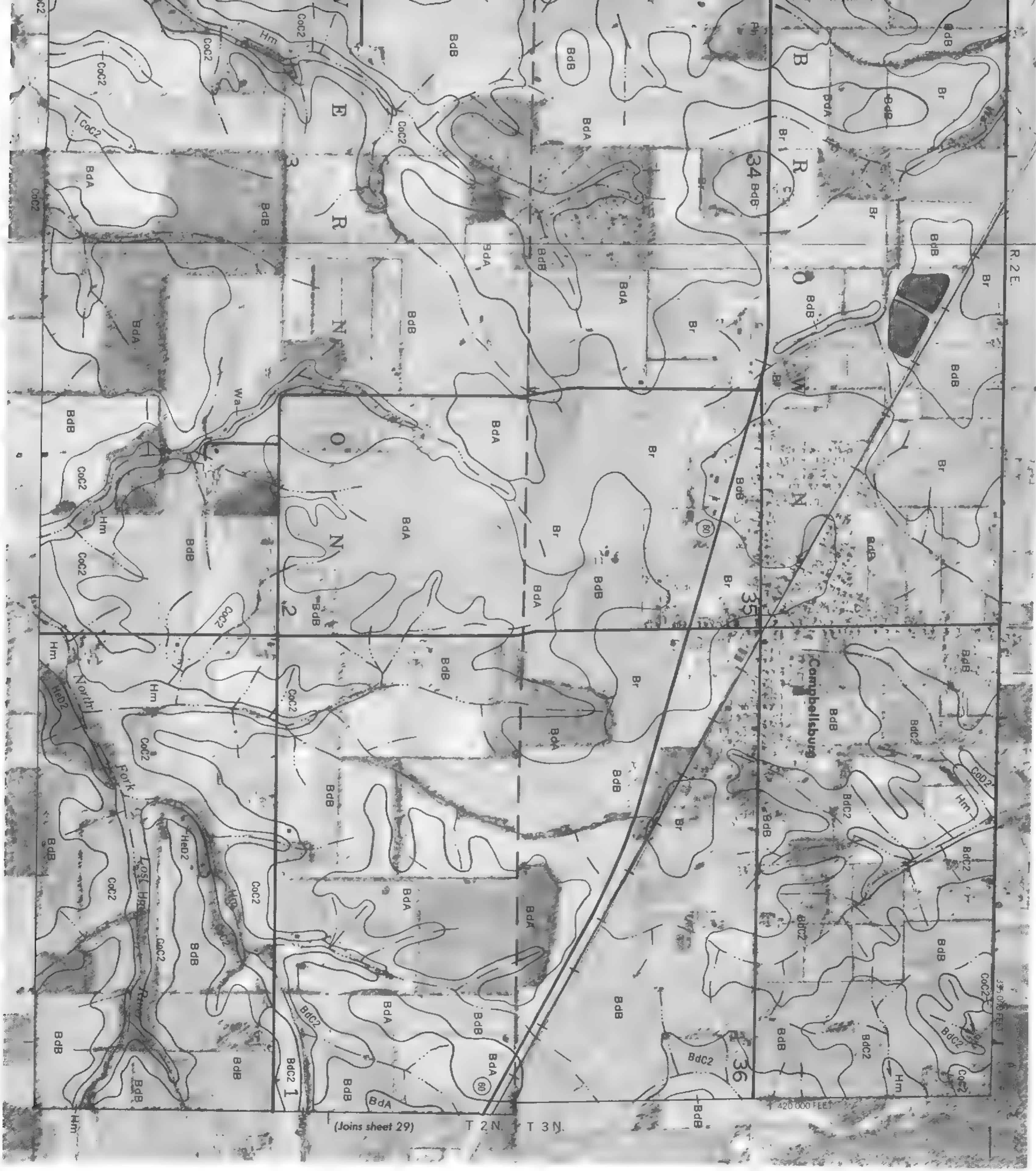

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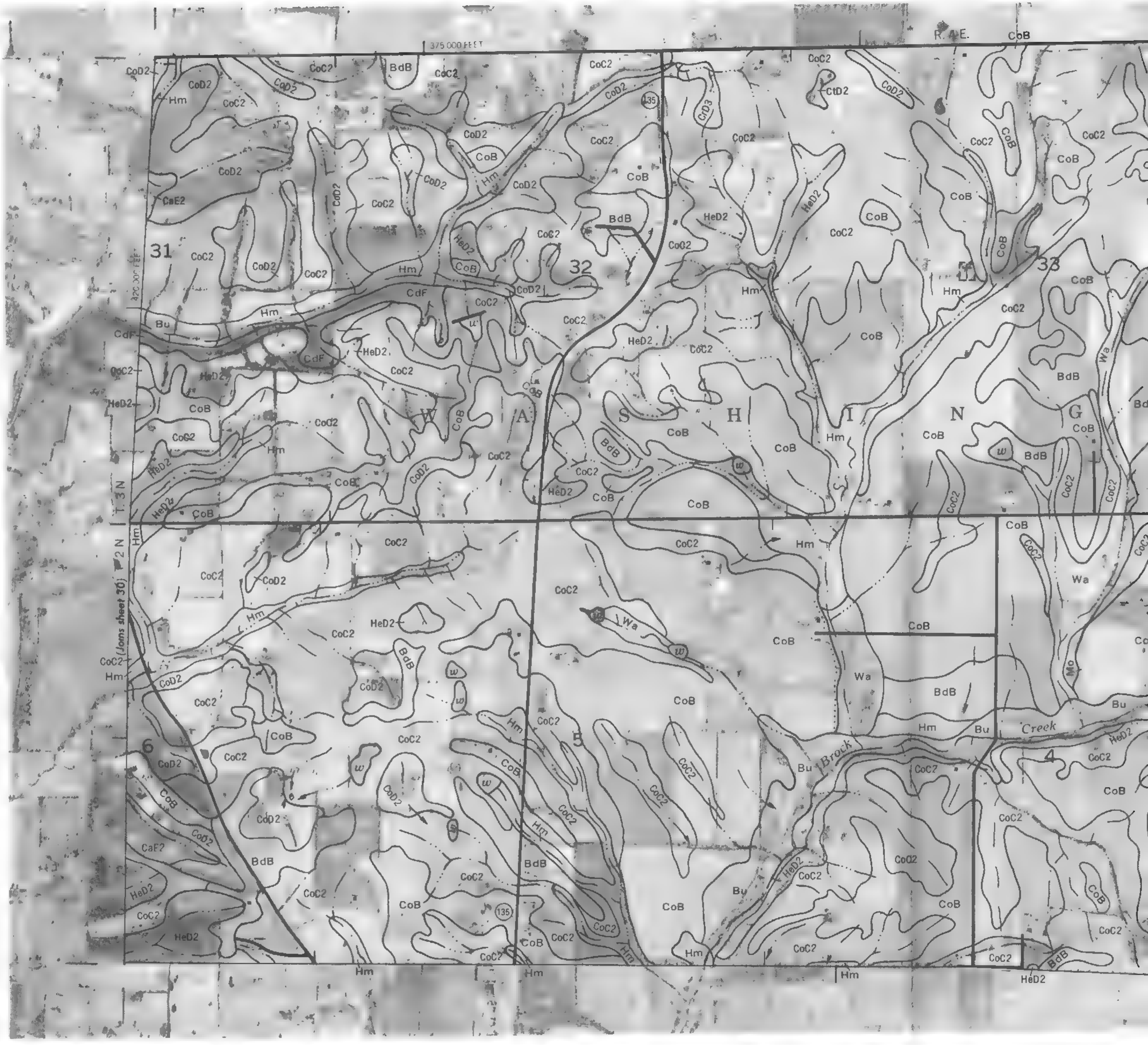

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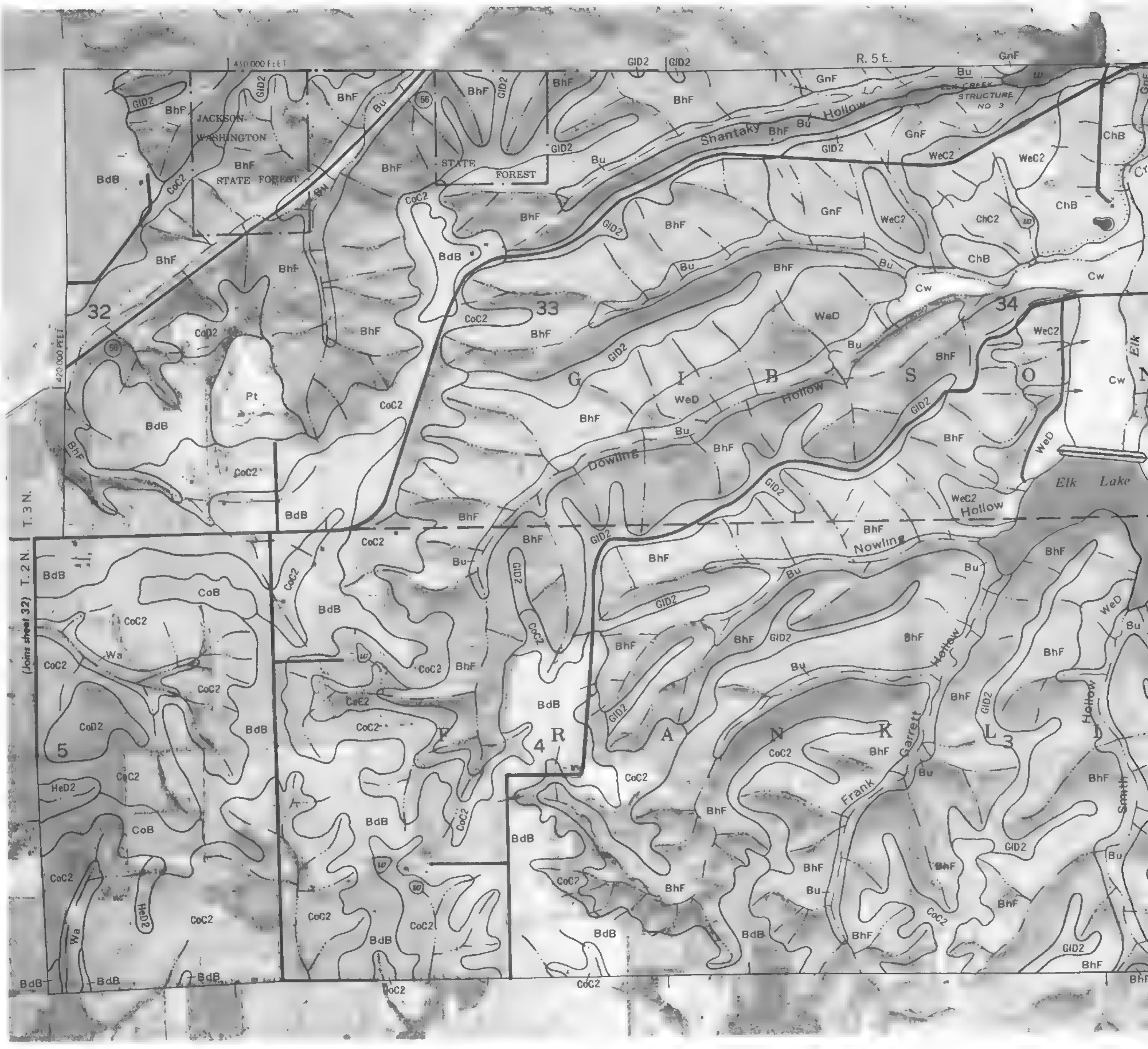

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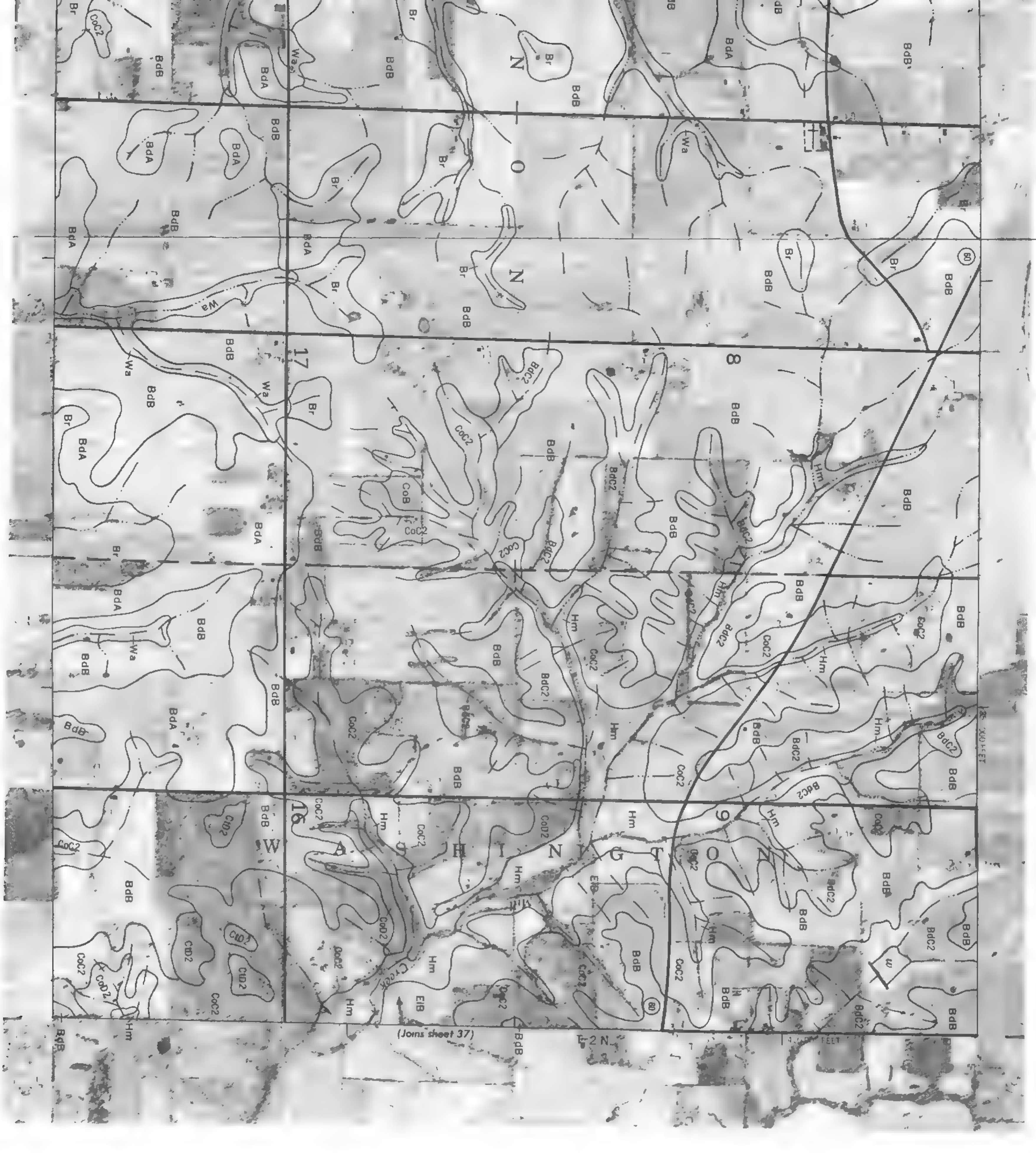
WASHINGTON COUNTY, INDIANA — SHEET NUMBER 35

WASHINGTON COUNTY, INDIANA — SHEET NUMBER 36



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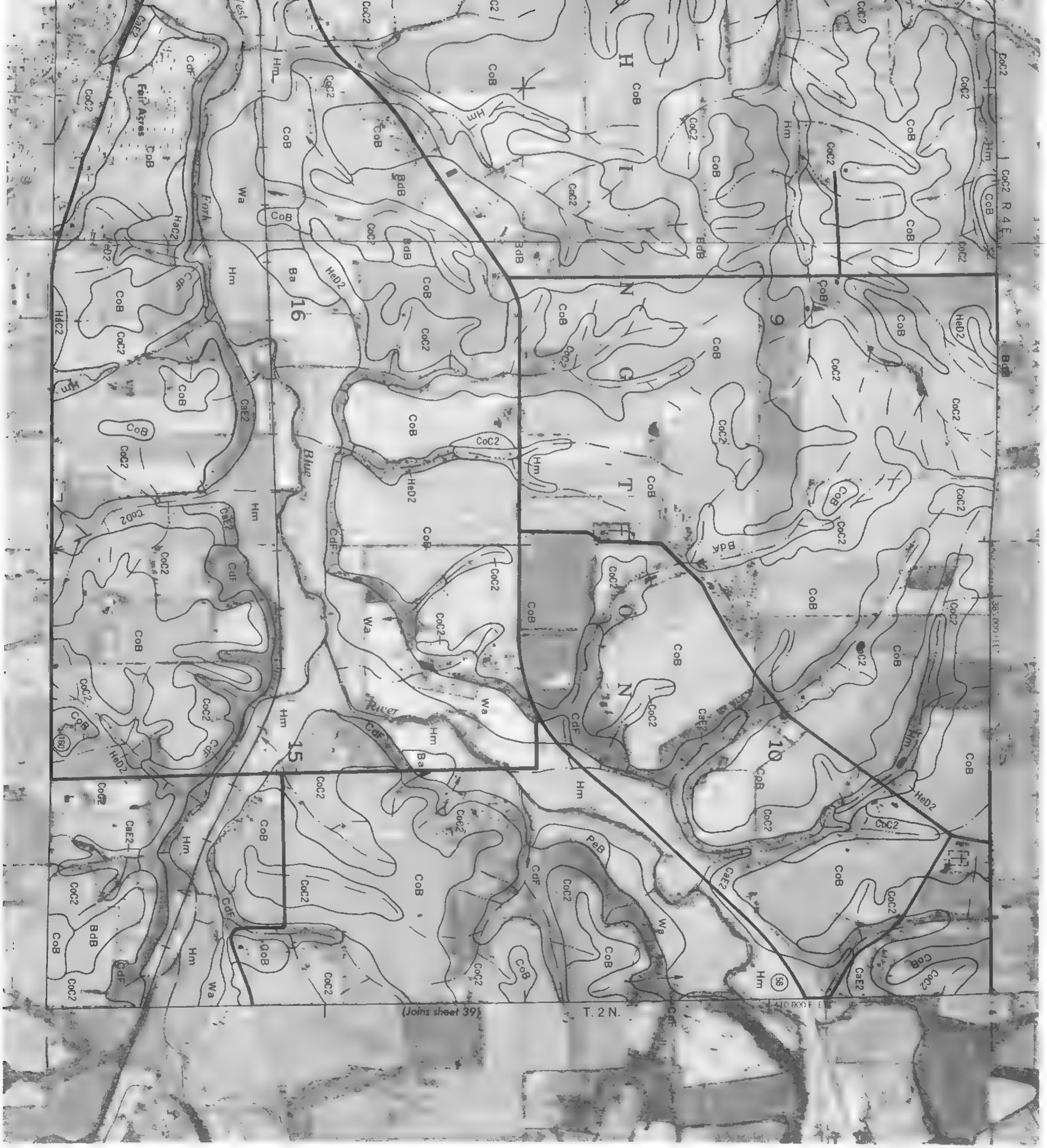

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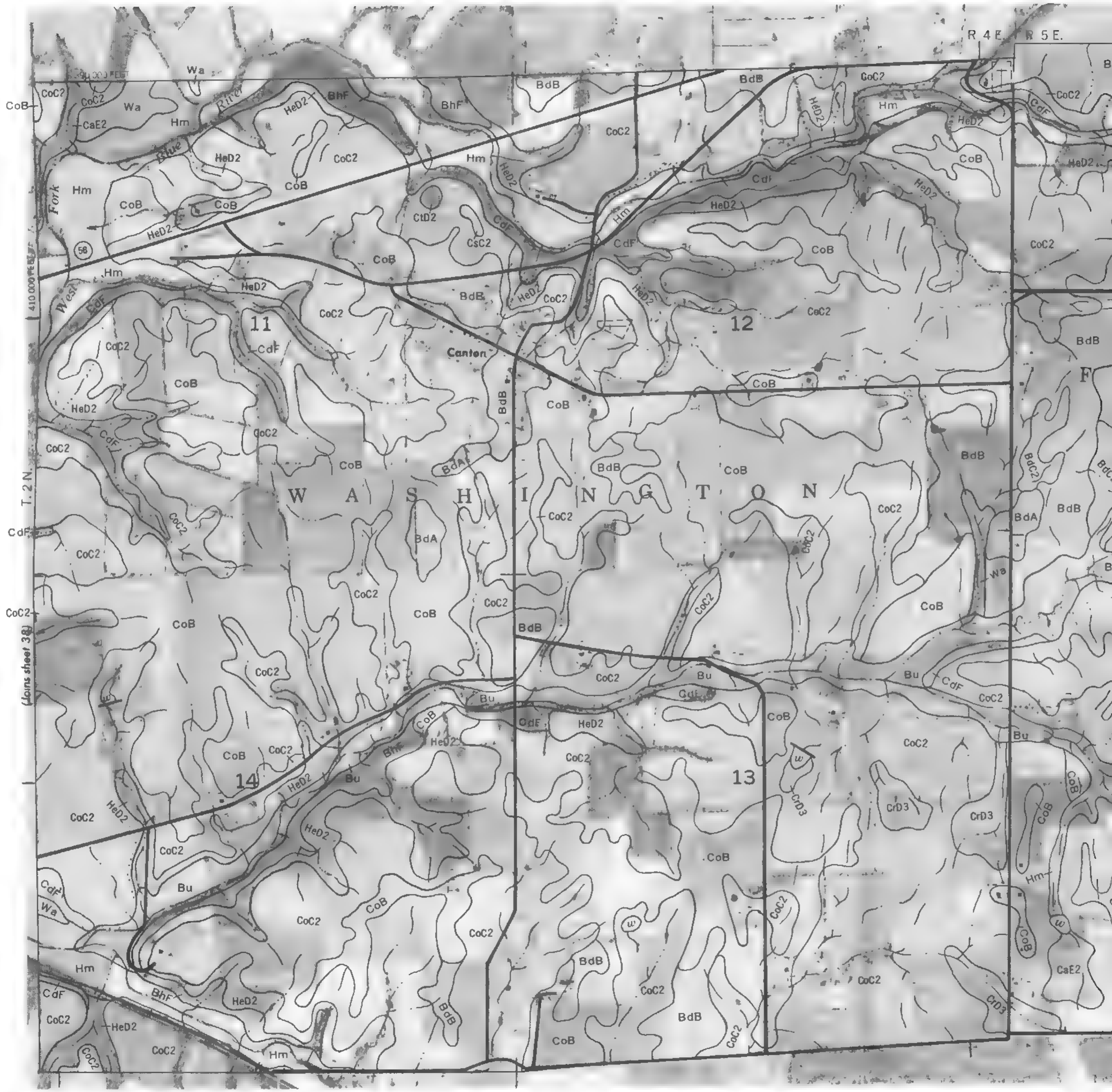

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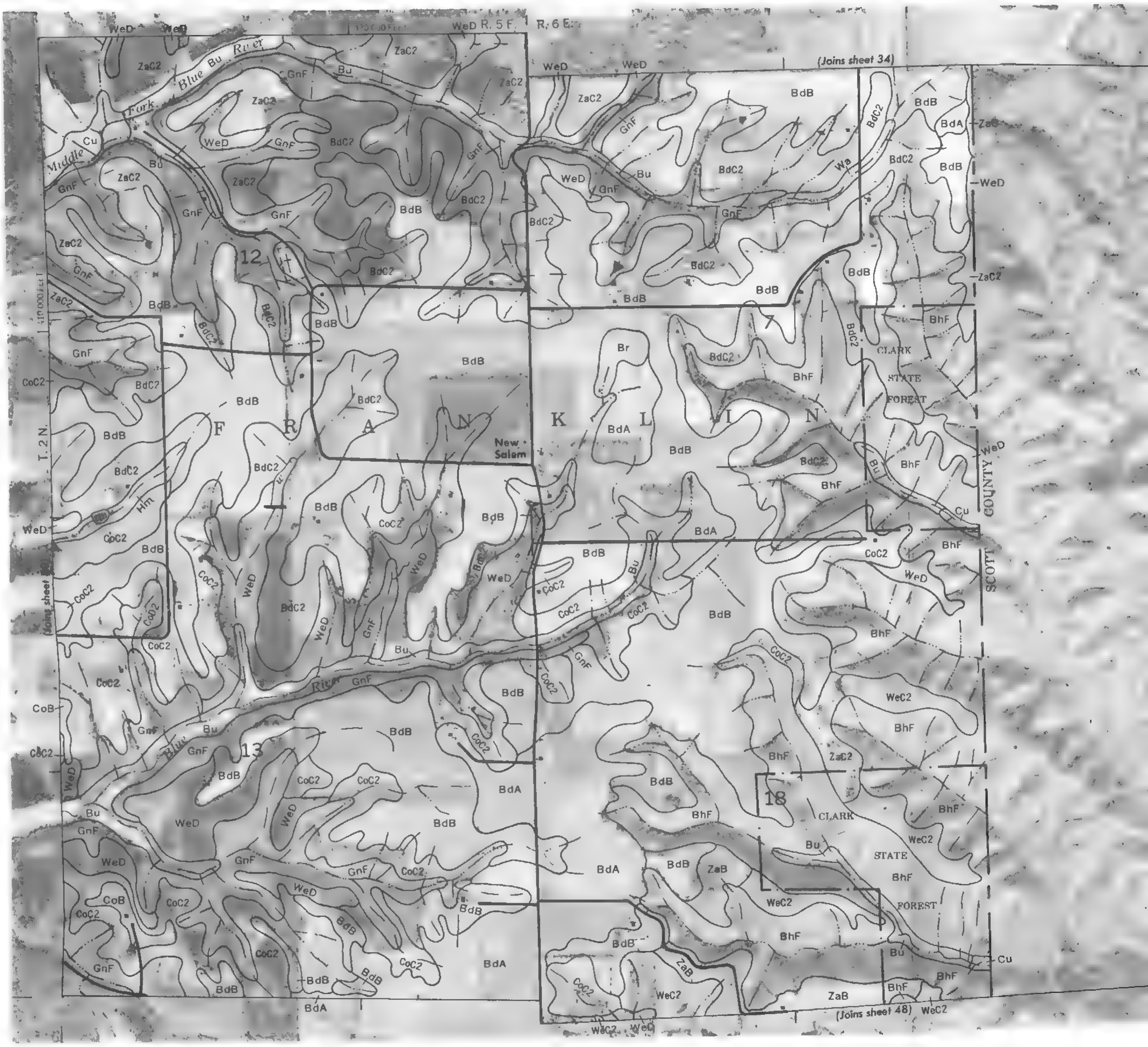

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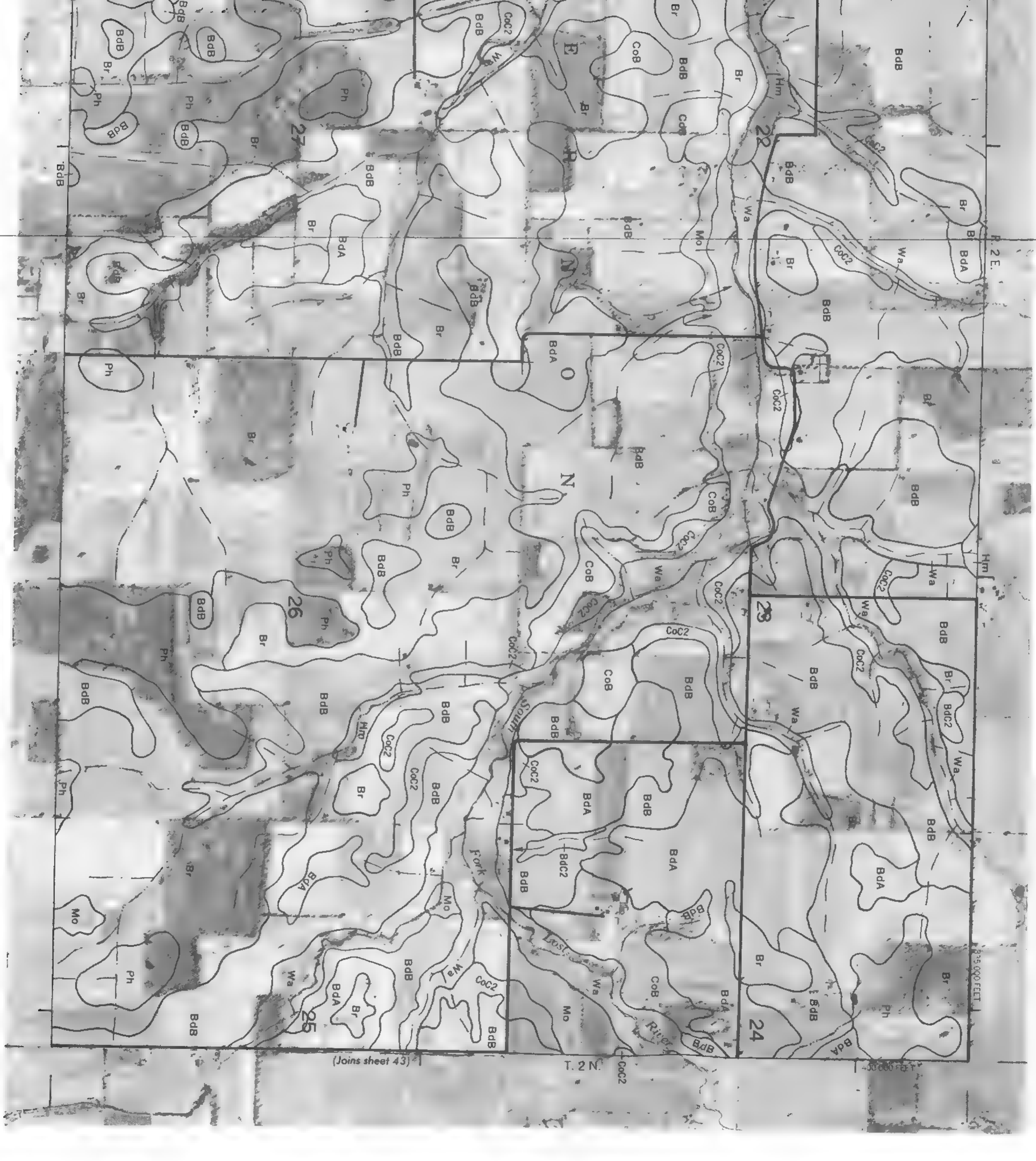

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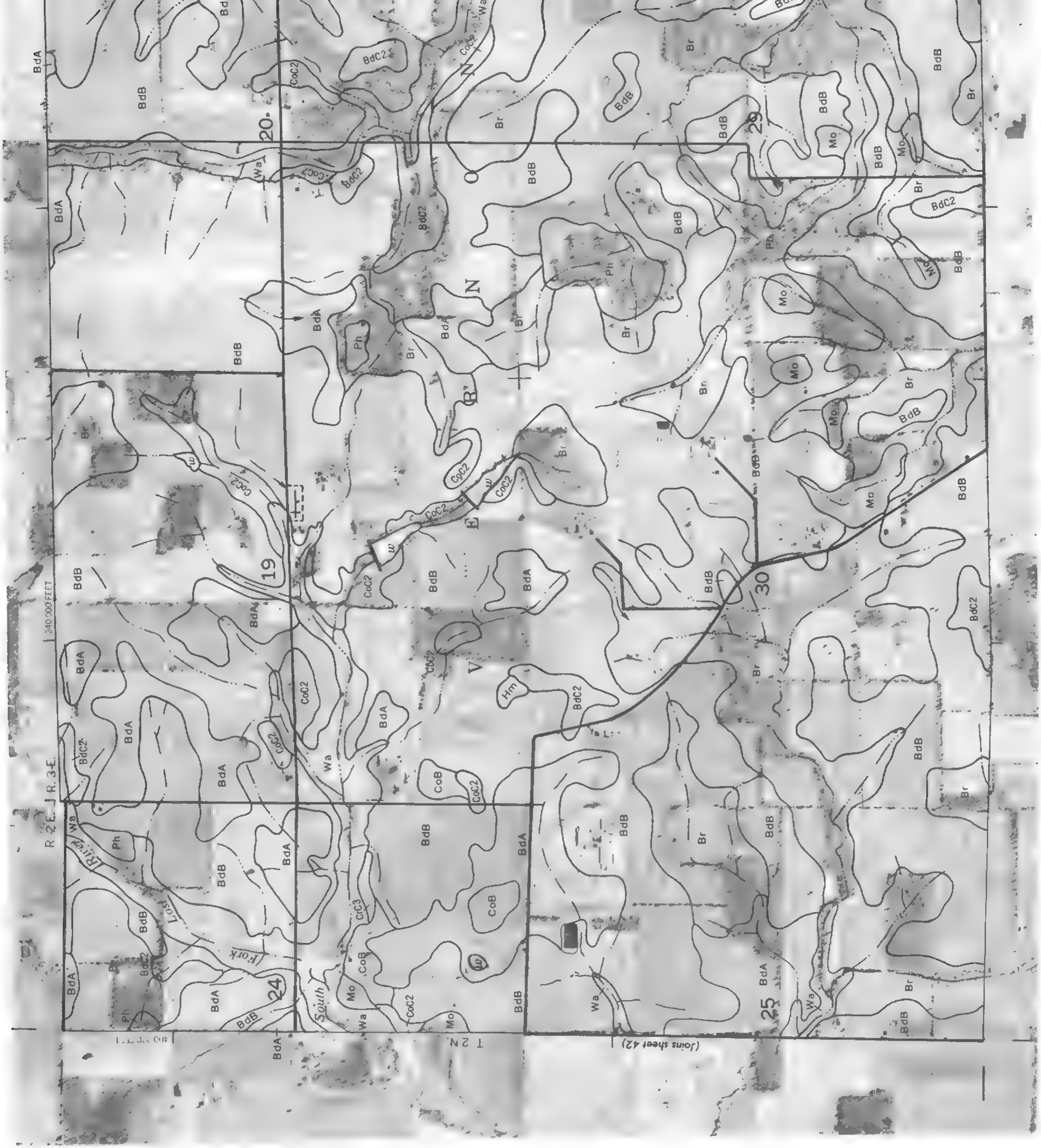

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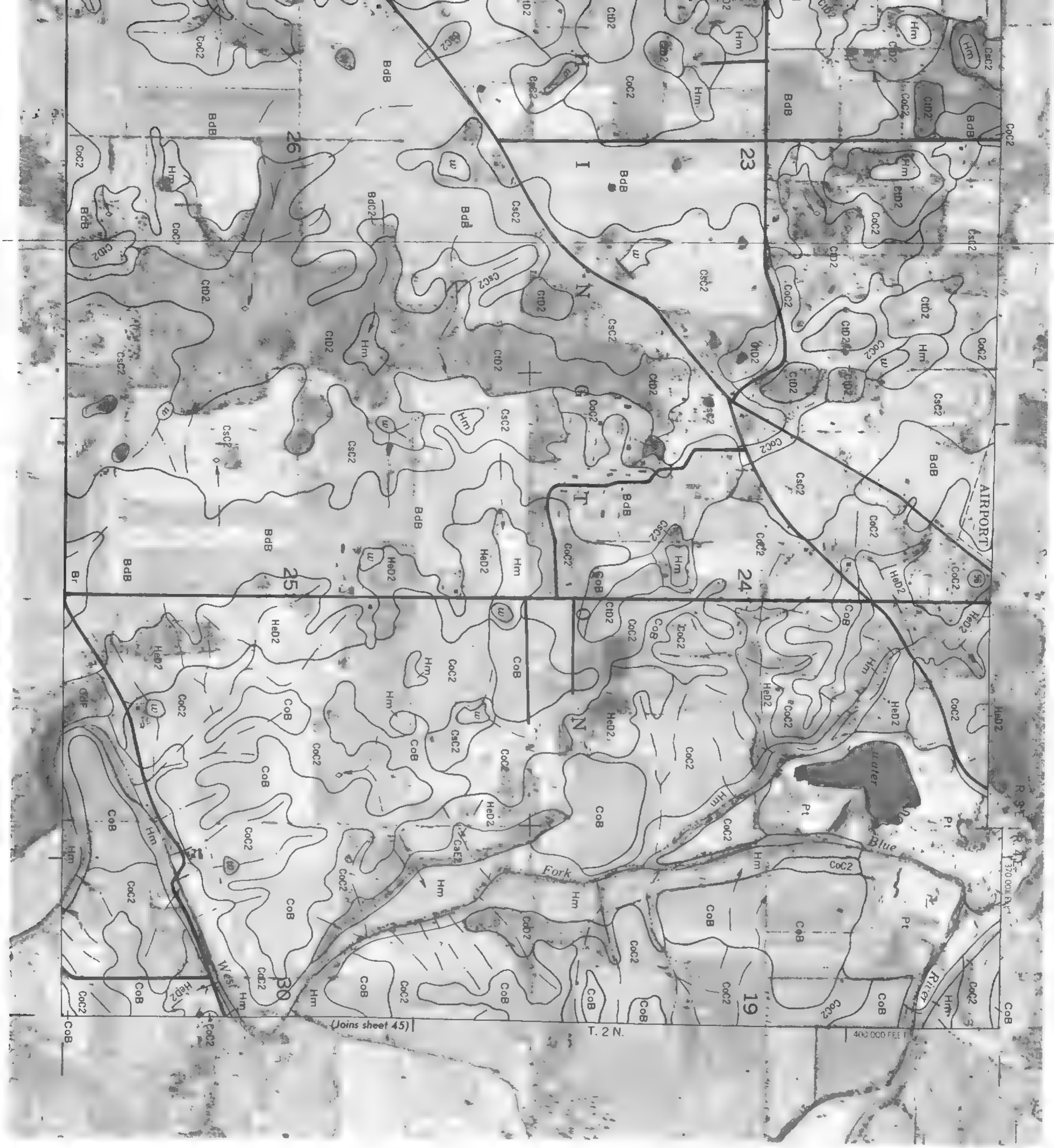

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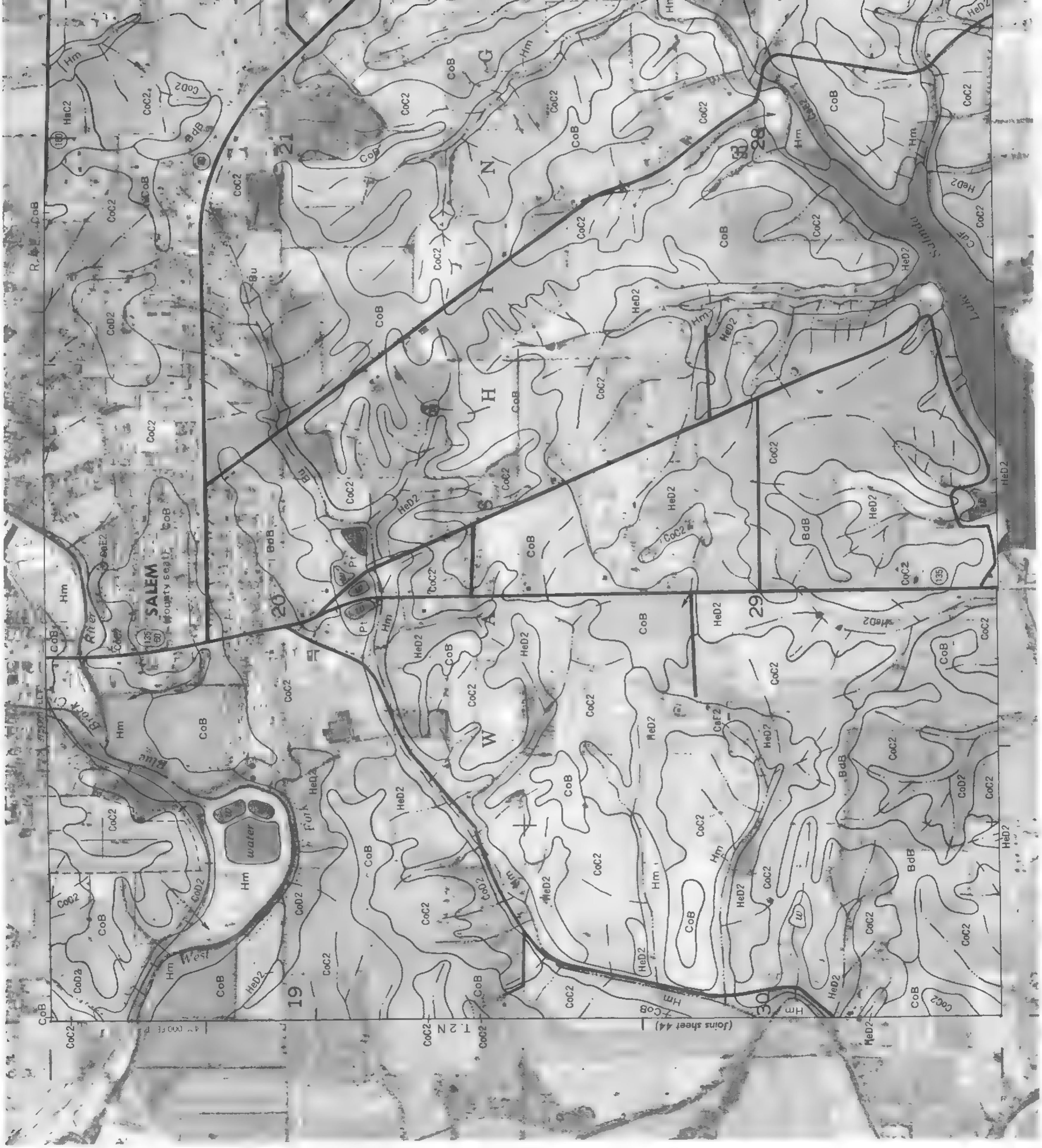
WASHINGTON COUNTY, INDIANA — SHEET NUMBER 45



WASHINGTON COUNTY, INDIANA NO. 45

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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WASHINGTON COUNTY, INDIANA NO. 47

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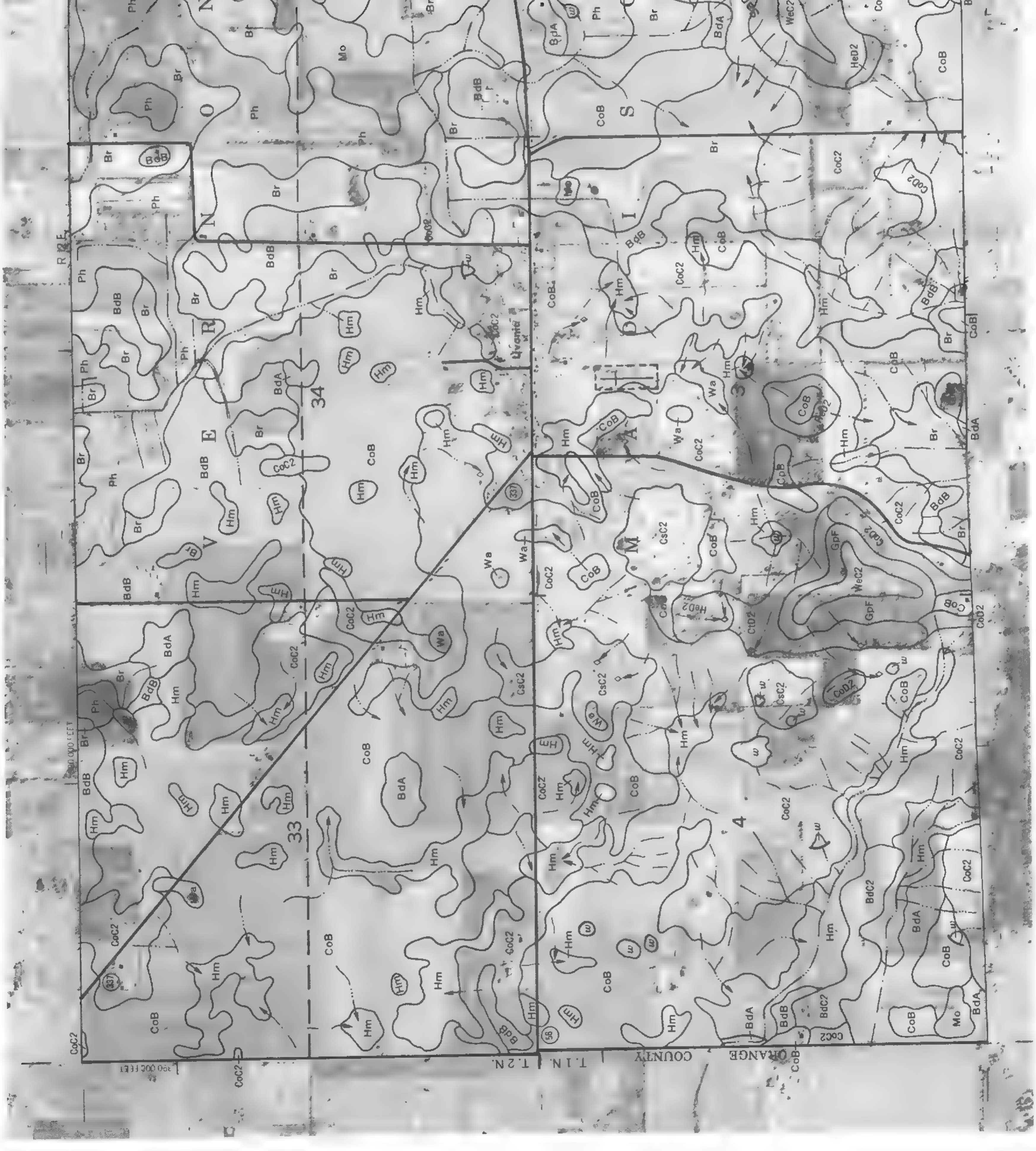

WASHINGTON COUNTY, INDIANA NO. 49

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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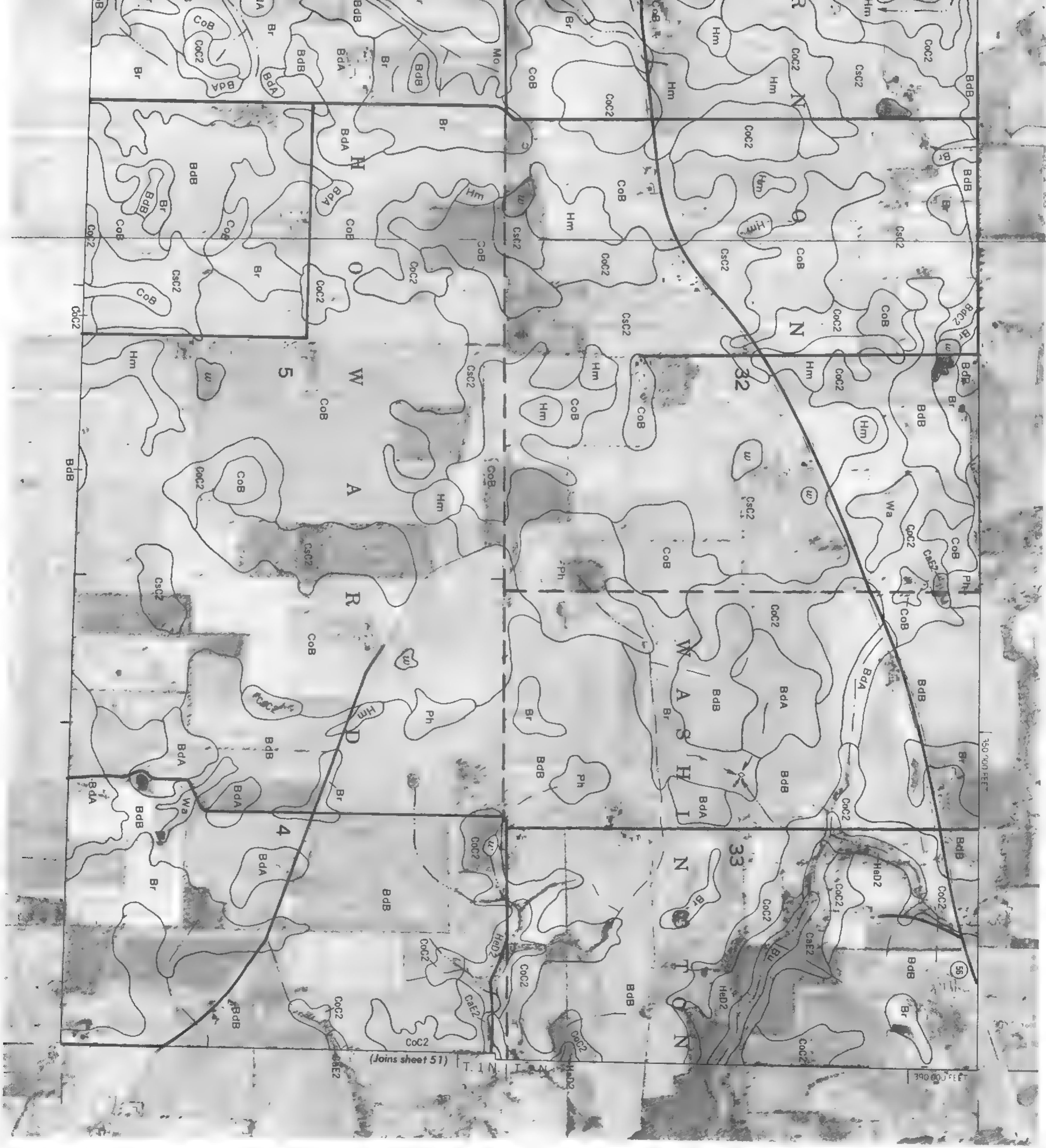
WASHINGTON COUNTY, INDIANA — SHEET NUMBER 50



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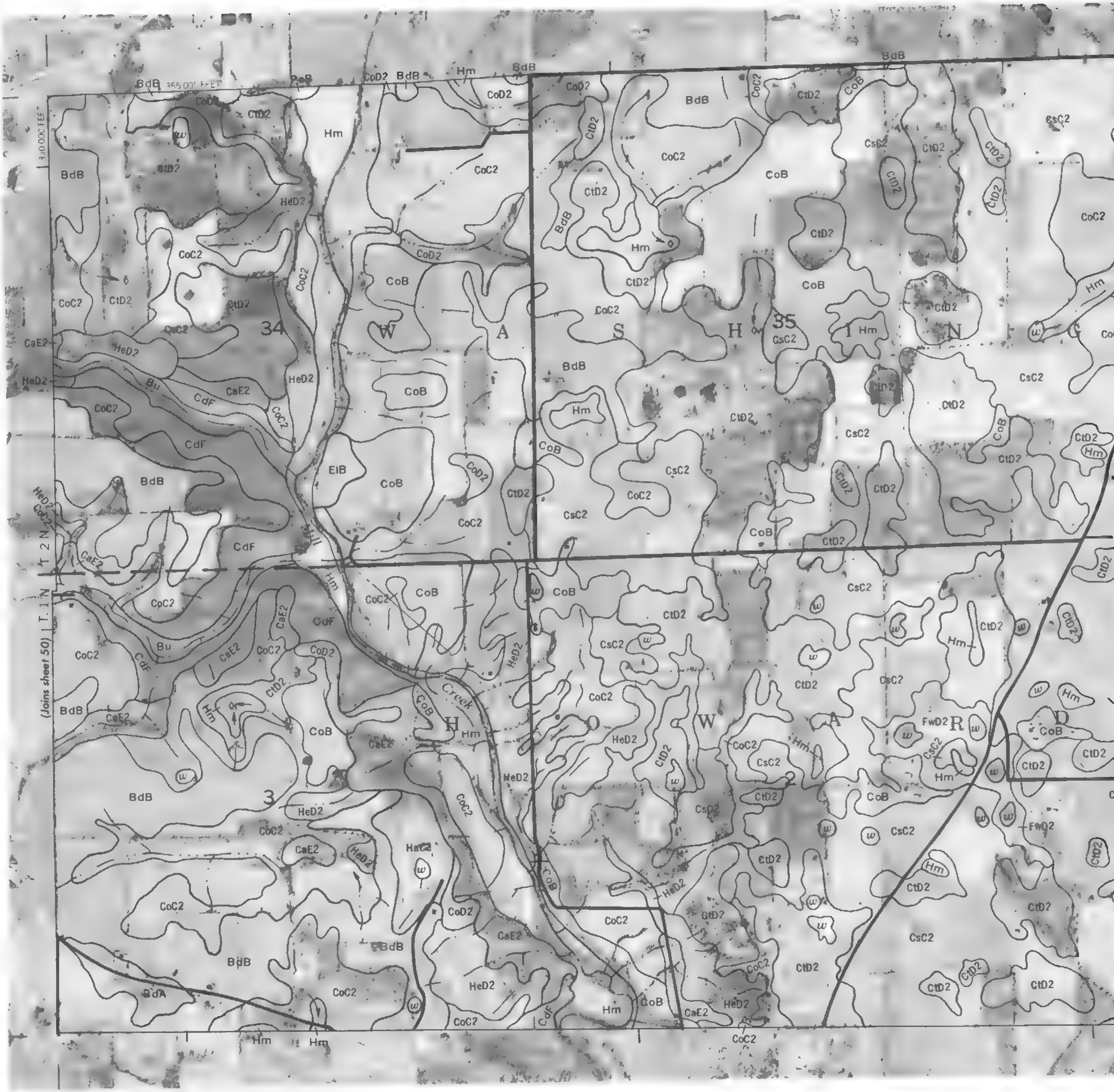

WASHINGTON COUNTY, INDIANA NO. 51

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies
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WASHINGTON COUNTY, INDIANA — SHEET NUMBER 52

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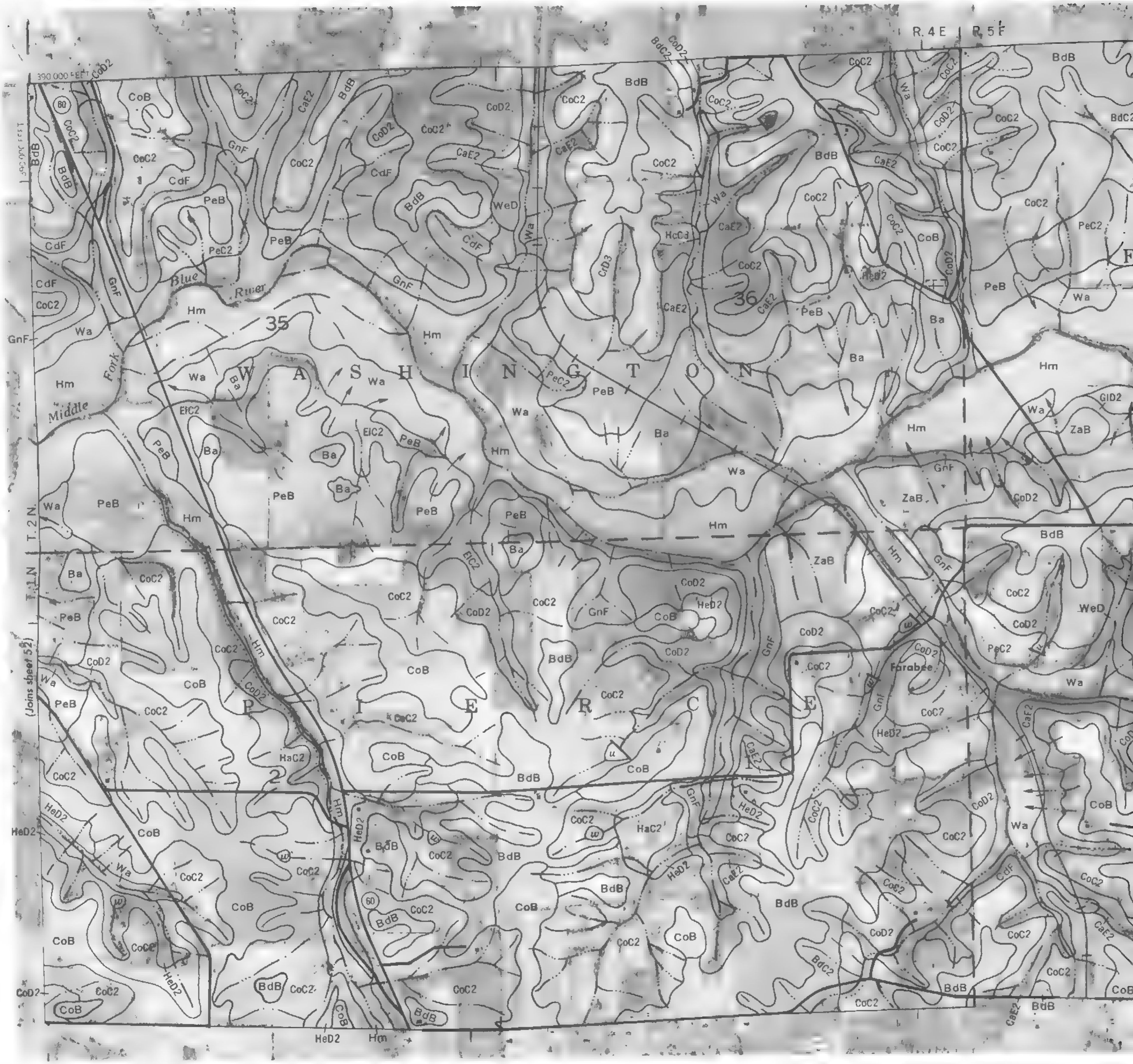
WASHINGTON COUNTY, INDIANA — SHEET NUMBER 53



WASHINGTON COUNTY, INDIANA NO. 53

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WASHINGTON COUNTY, INDIANA — SHEET NUMBER 54

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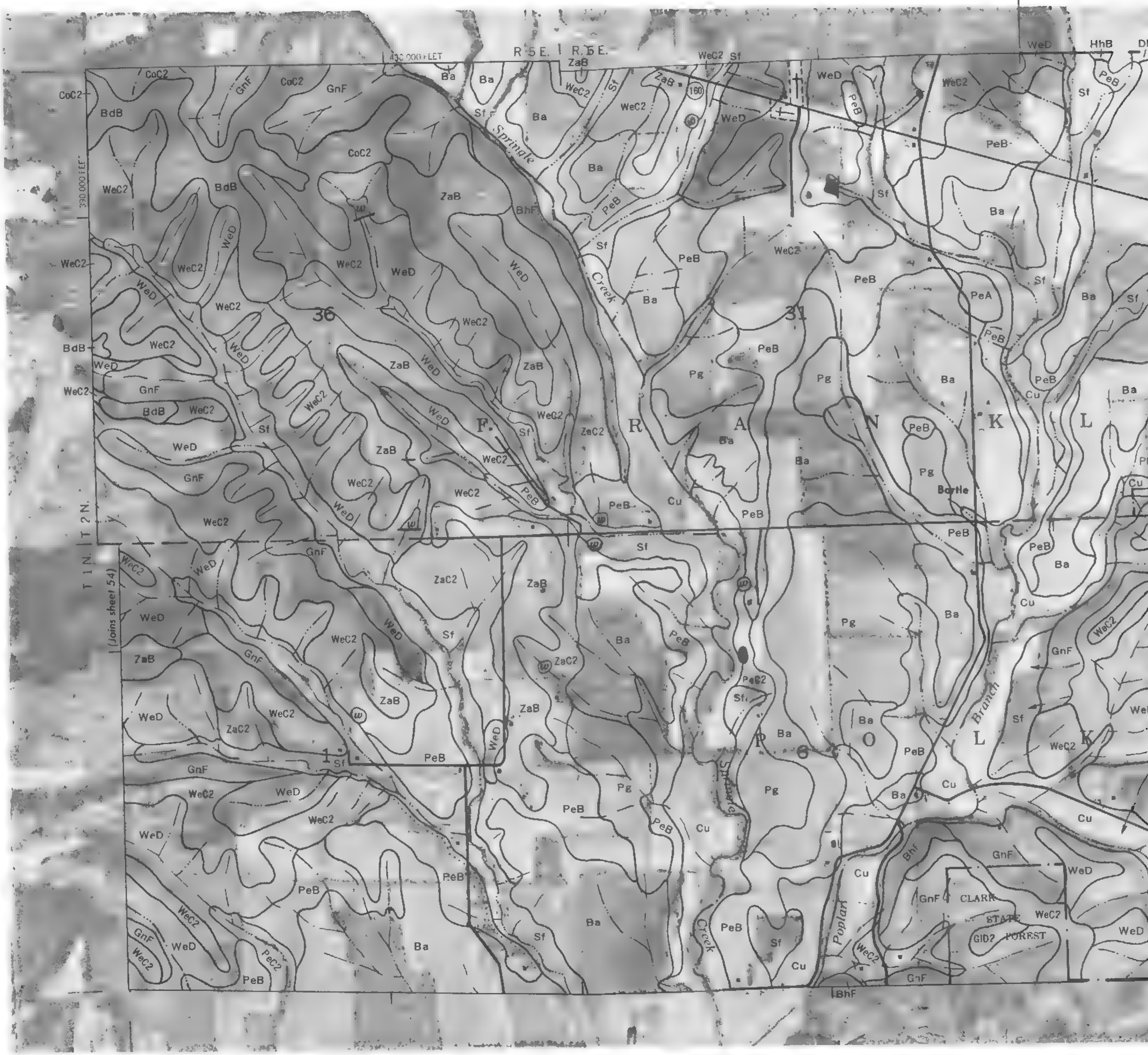
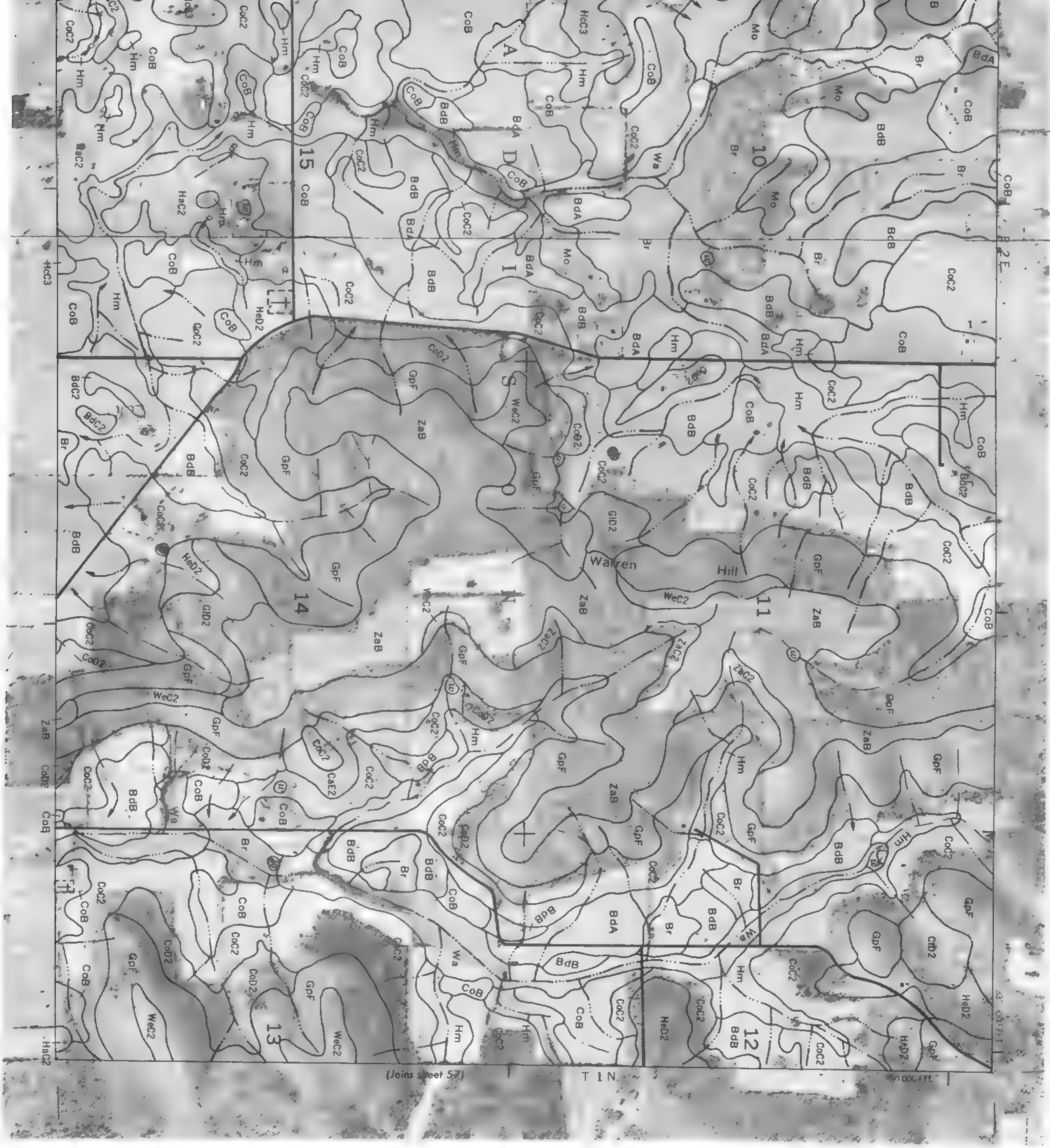


WASHINGTON COUNTY, INDIANA NO. 55

This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

WASHINGTON COUNTY, INDIANA — SHEET NUMBER 56



This map is compiled on 1975 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
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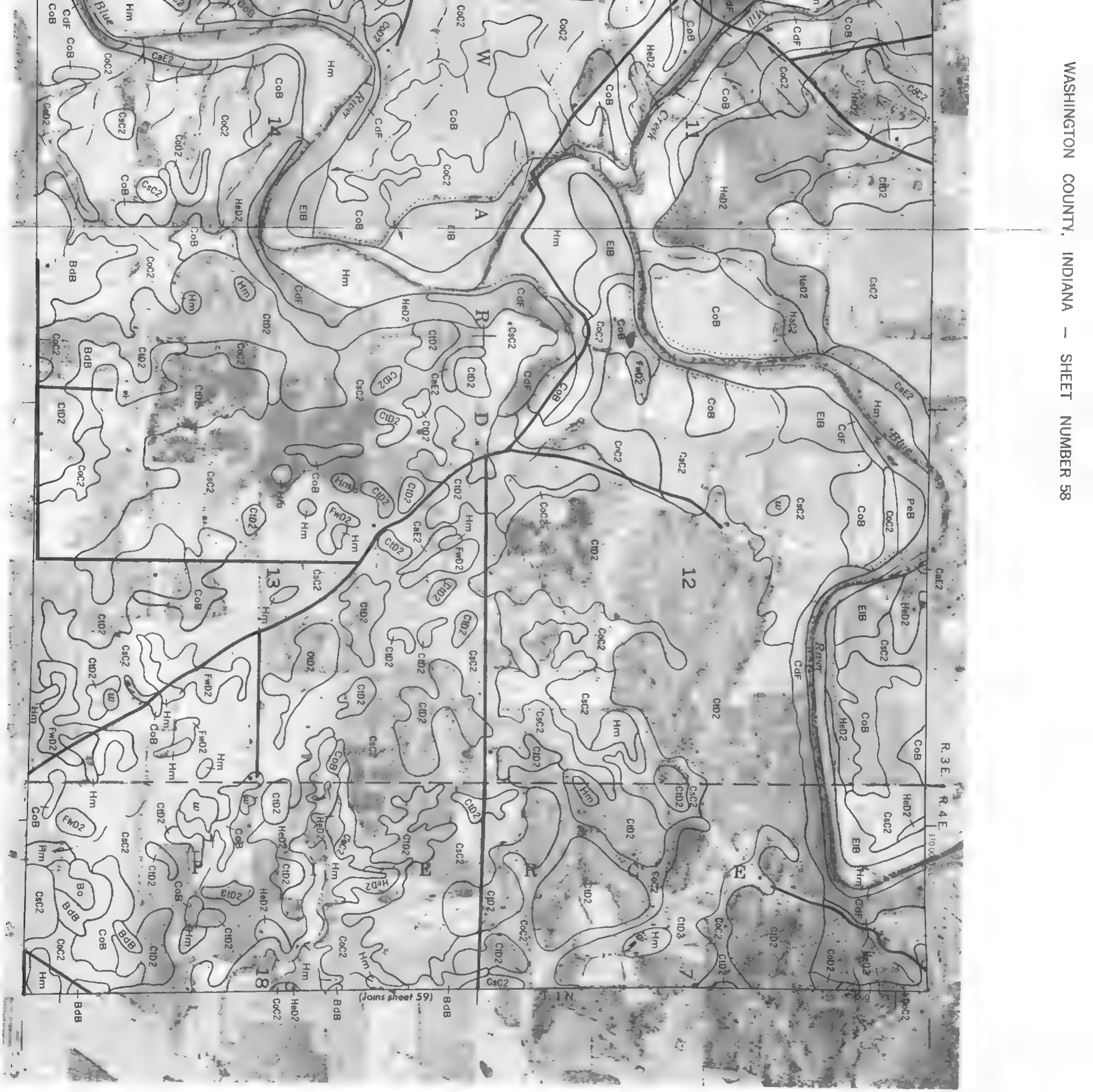

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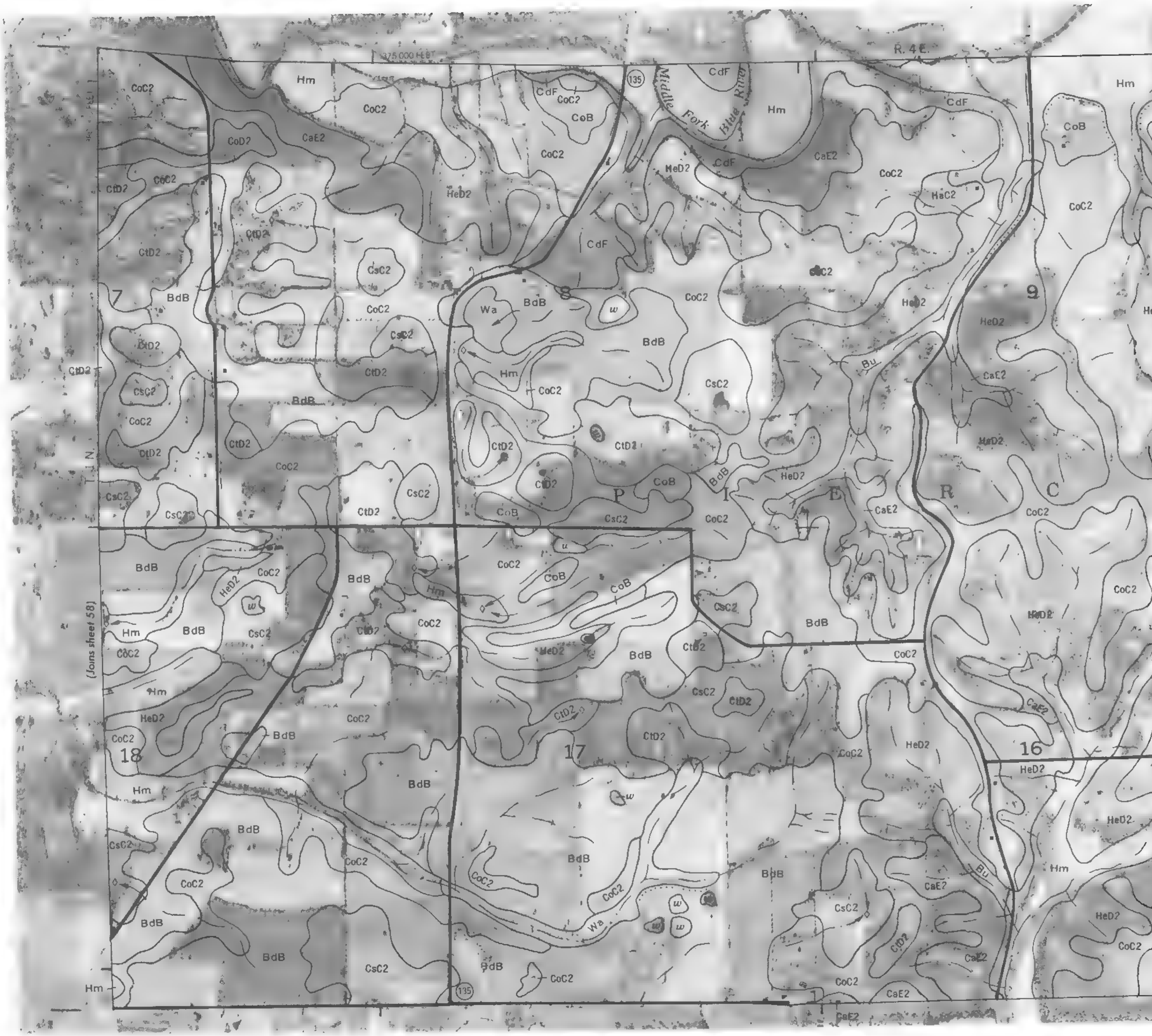

WASHINGTON COUNTY, INDIANA NO. 59

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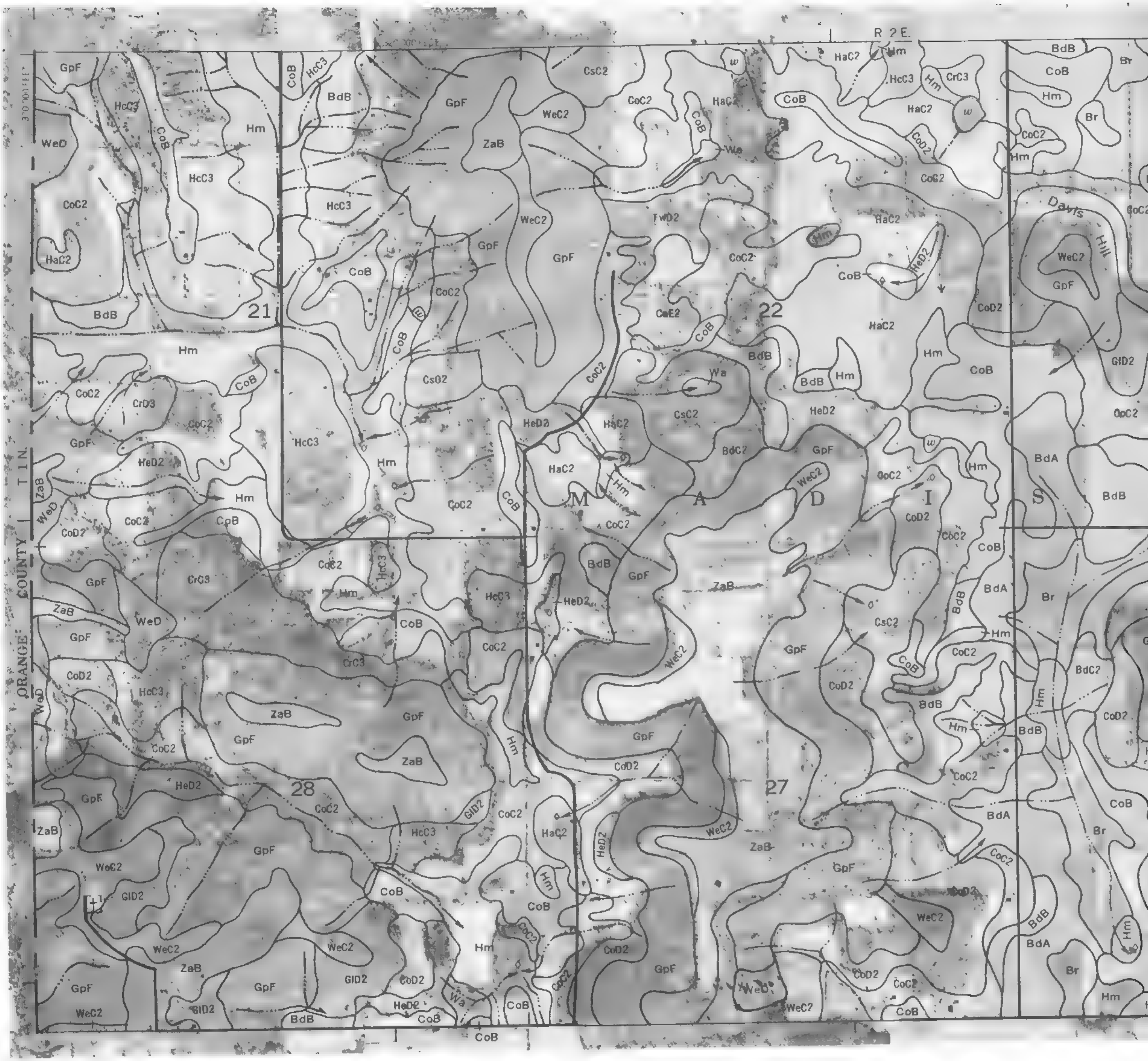

WASHINGTON COUNTY, INDIANA NO. 63

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WASHINGTON COUNTY, INDIANA NO. 64

WASHINGTON COUNTY, INDIANA NO. 65

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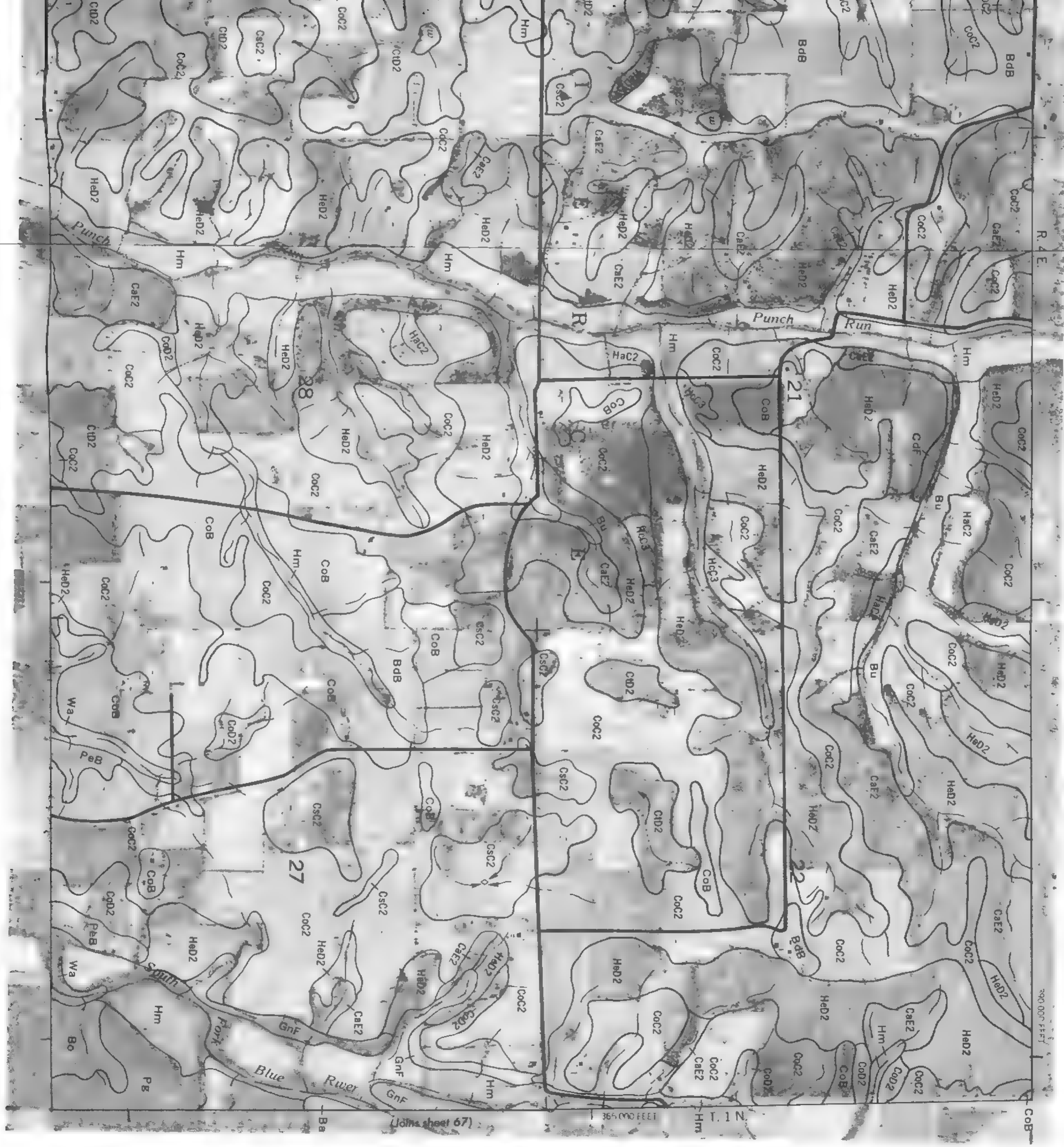
WASHINGTON COUNTY, INDIANA — SHEET NUMBER 66



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WASHINGTON COUNTY, INDIANA NO. 66

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WASHINGTON COUNTY, INDIANA — SHEET NUMBER 68

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WASHINGTON COUNTY, INDIANA NO. 68

INSET A

2000 AND 5000-FOOT GRID TICKS

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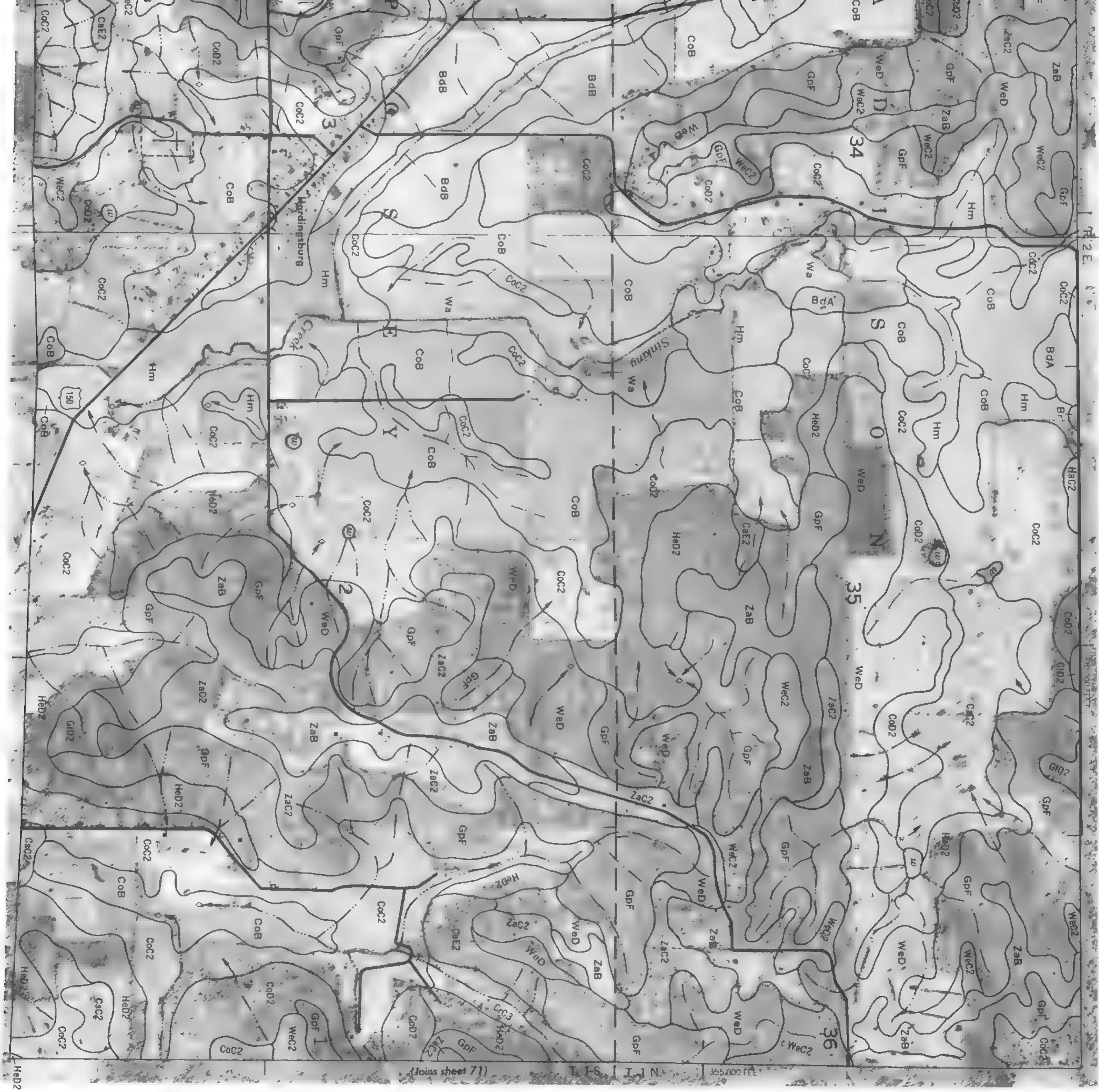
WASHINGTON COUNTY, INDIANA — SHEET NUMBER 70



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WASHINGTON COUNTY, INDIANA NO. 71

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WASHINGTON COUNTY, INDIANA — SHEET NUMBER 72

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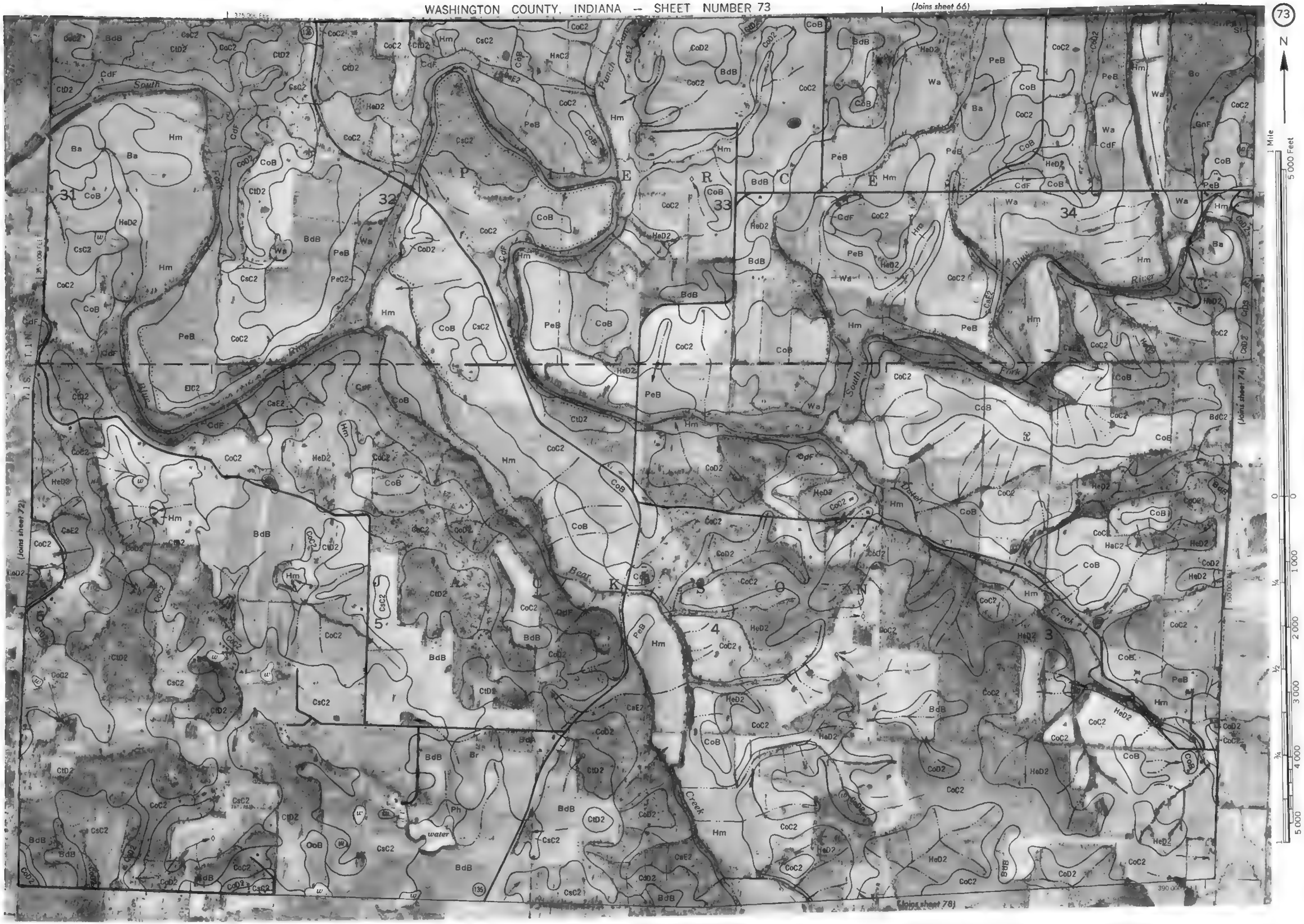
WASHINGTON COUNTY, INDIANA NO. 72



WASHINGTON COUNTY, INDIANA NO. 73

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WASHINGTON COUNTY, INDIANA — SHEET NUMBER 74

WASHINGTON COUNTY, INDIANA NO. 75

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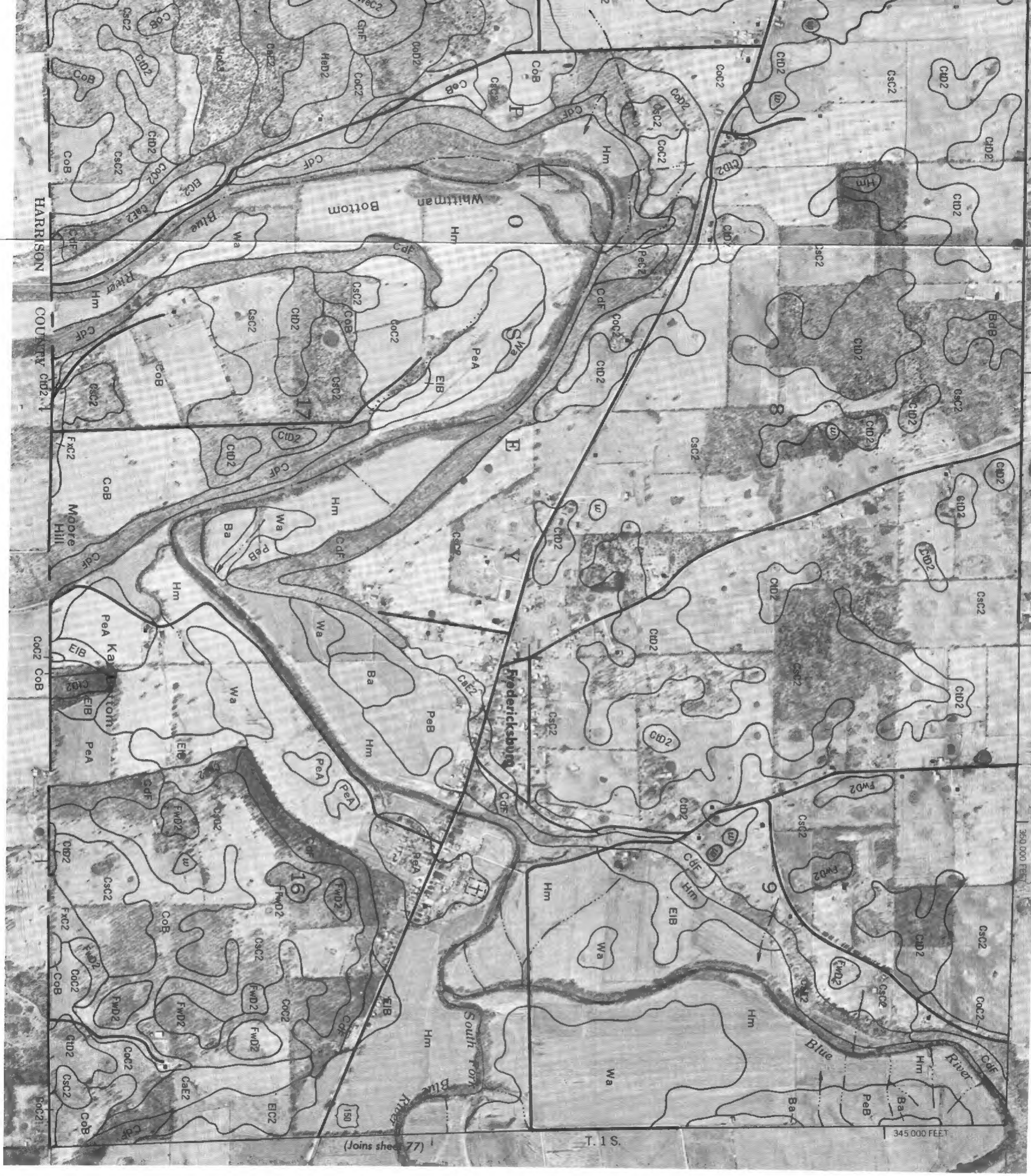
WASHINGTON COUNTY, INDIANA — SHEET NUMBER 76



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WASHINGTON COUNTY, INDIANA NO. 76

WASHINGTON COUNTY, INDIANA NO. 77

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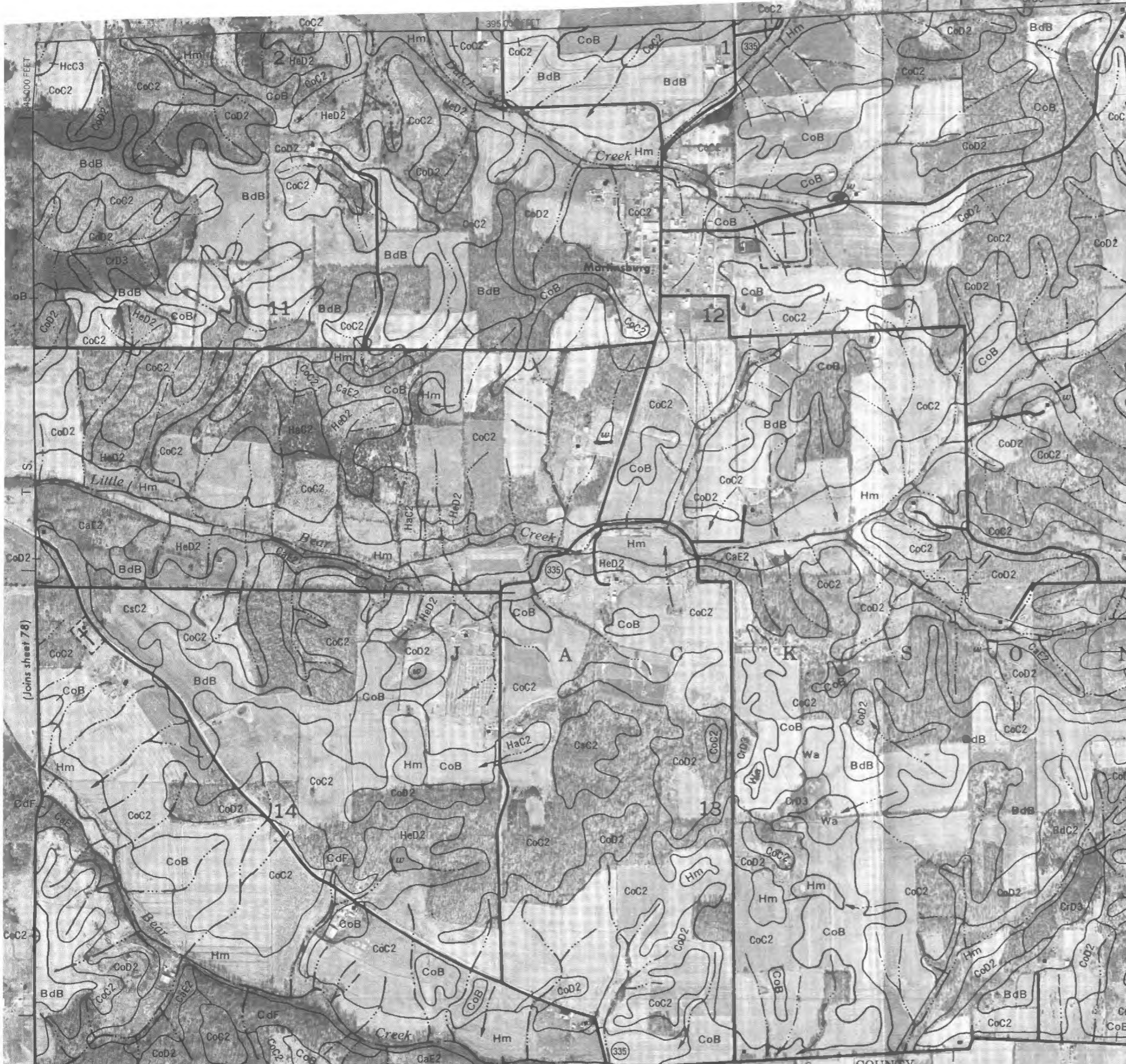

WASHINGTON COUNTY, INDIANA NO. 79

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